WORK

An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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VOL. III.—No. 133.] SATURDAY, OCTOBER 3, 1891. [PRICE ONE PENNY.

MAKING THE BEST OF A BAD HOUSE.

BY MARK MALLETT.

INTRODUCTORY REMARKS—MY HOUSE AS I FOUND IT—A WHITEWASHED KITCHEN AS A SNUGGERY—MAKING MY STUDY—THE FIREPLACE.

Introductory Remarks.—Of that estimable class of persons to which the writer, in common, probably, with many of the readers of WORK, belongs—those, namely, who have more taste and skill than money—the great majority have to live in something very different from what they would picture as "ideal homes." The ordinary dwellings of those who have to work for their bread are, as a rule, unsightly and uninteresting. Effectual shelters from the elements they may be, but in other respects they are mere makeshifts.

Now I wish to show how we, who have taste and ingenuity, may do much to improve matters (so far as our own homes are concerned) without money. We, the readers of WORK, are not helpless beings. We know how to use our hands in many ways, and in various arts and crafts are independent of paid help. From my own experience I propose to give some hints to those who have the will and the ability for this kind of work, but may not see exactly how to set about it.

I propose to describe and illustrate some of the changes that I have myself made in a most unpromising house. I do not suppose that any reader can follow exactly in my steps, ugly houses being of so many different sizes and patterns; but I trust he will find what I have to say suggestive, and that he may be able to adopt and improve upon my plans. Also, that I may be of as much practical use as possible, I hope to point out alternative methods when such seem likely to be of more general service than those adopted by myself.

Before I bring these preliminary remarks to a close, there are certain points to which I should especially wish to call attention. They are, that from first to last I had, for imperative reasons, to carry out my work on the most economical lines; that, with some few trifling exceptions, all that was done was done with my own pair of hands, and

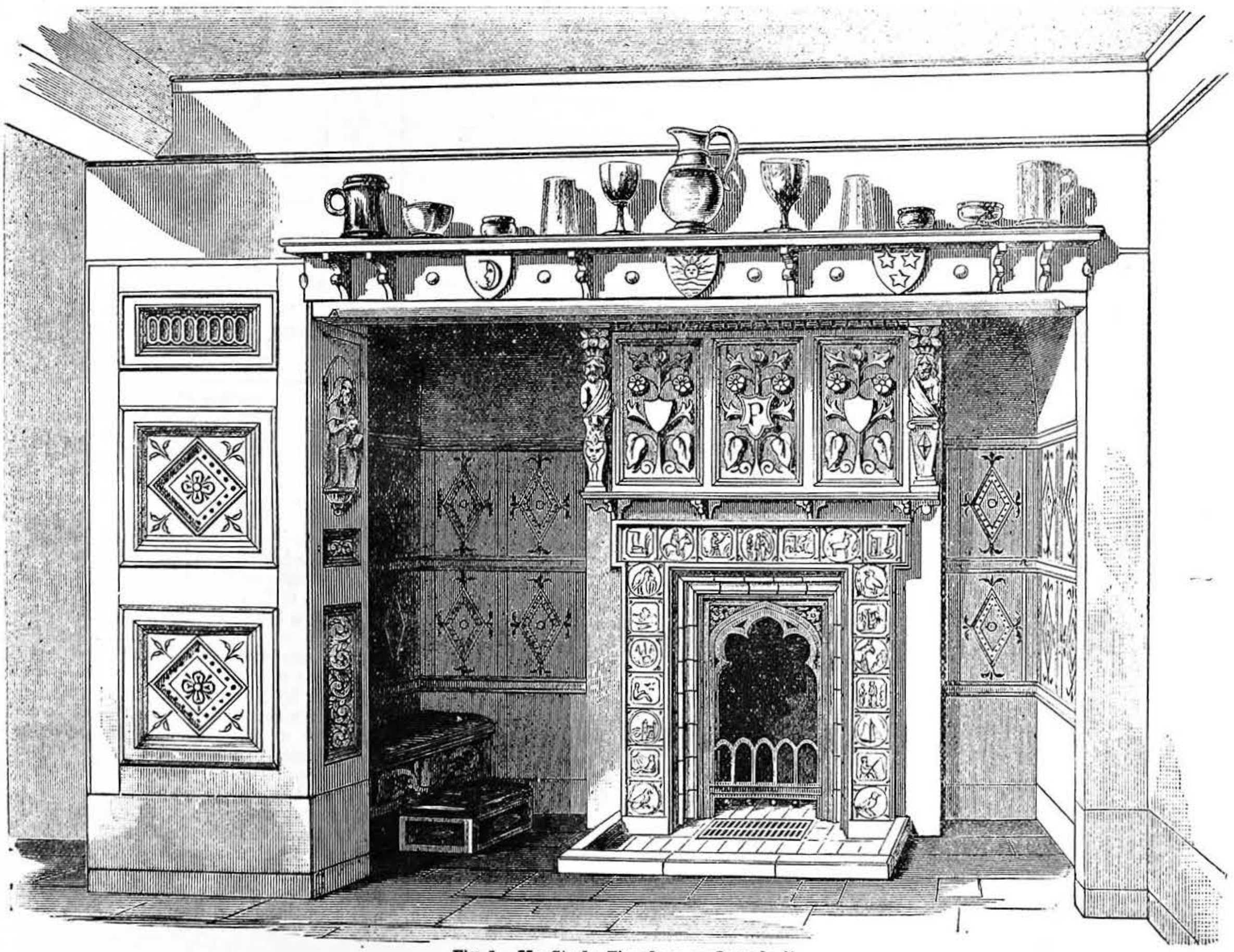

Fig. 1.—My Study Fireplace as I made it.

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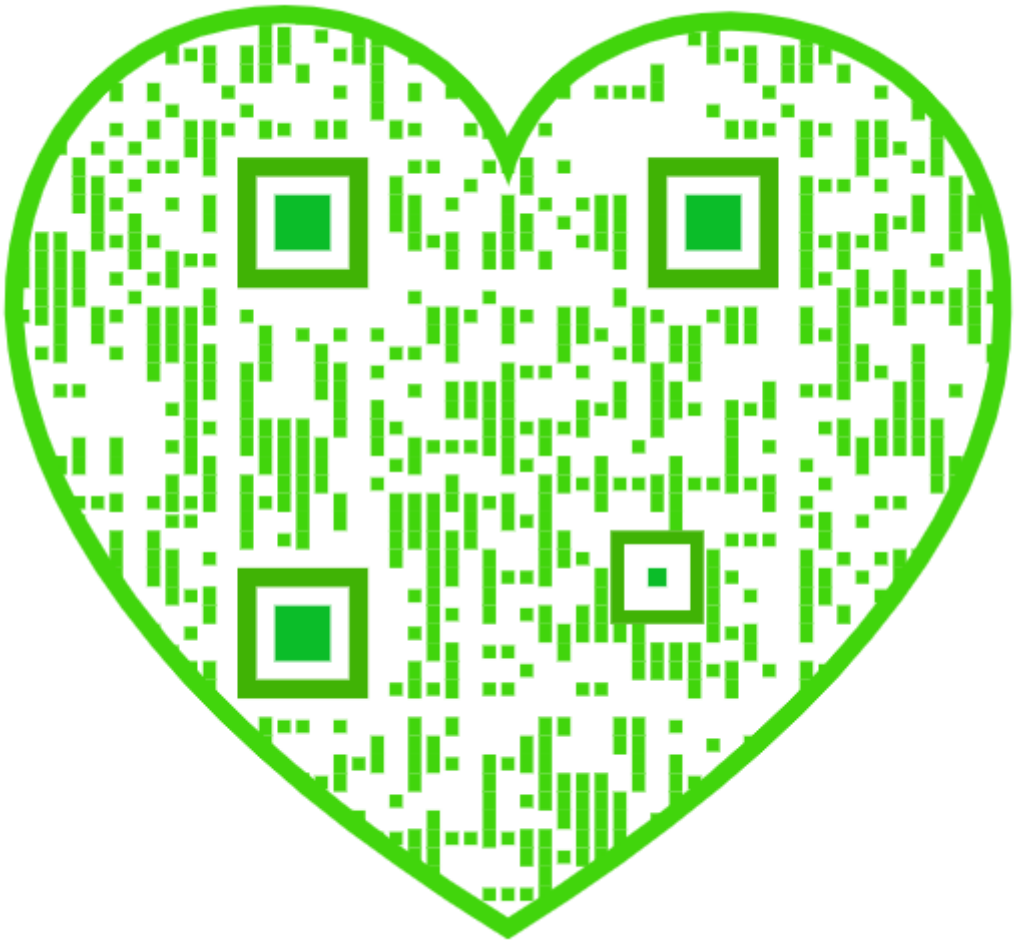

that what I accomplished was not the amusement of a life of leisure, but the occupation of the evenings and odd times of days spent in that toil for daily bread which falls to the lot of most of us. I particularly mention these things for the encouragement of those fellow-workers who, in respect to the gifts of fortune, may not be better situated than myself.

My House as I found It.—That house which has been the scene of my labours, and which came into my hands some few years since, is in a country village, and probably was once a farmhouse. It is an old stone building, with low ceilings, and though the principal windows seem once to have had good stone mullions, these have long since been knocked away to give place to mean wooden frames. When I entered upon it I found the walls, where not whitewashed, covered with cheap and tawdry papers, and the woodwork throughout painted of a uniform and dismal drab. When I mention that its rateable value was estimated at ten guineas *per annum*, I shall enable the reader more clearly to realise what manner of house it was.

I must admit that it was not what would generally be considered an attractive residence. Such of my friends as I carried to see it in its pristine state wondered at my choice, and one or two of the more intimate told me candidly that I should never be able to make anything of it.

But I was not disheartened. I gave my friends to understand that my house had one point in its favour which they had not taken into account—namely, that it was so utterly bad as to have no part on which I should fear to make experiments or fear to spoil, and it was therefore the right sort of subject to take in hand. In short, it was my private belief that there could be no house so hopeless but that its inmate might, by judgment and perseverance, make it a thing of interest and beauty. The reader shall judge whether in the case in hand I was in the right.

A Whitewashed Kitchen as a Snuggery.—On the ground floor of my house was one room into which my friends looked with more than the usual amount of despair on their faces: it was that which I had selected for my especial den and sanctum. Its size was 18 ft. by 12 ft. On one side a door led to it from the modest entrance hall, and on the other a second door opened from it to the garden. It was lighted by a single window of no great size at one end. Across the middle of its ceiling ran a heavy wooden beam. The bare, whitewashed walls had neither cornice nor skirting-board. It had a large, open fireplace some 7 ft. wide, which projected three or four feet into the room. It appeared to have been used as some sort of kitchen (though not needed as such, there being a sufficient kitchen elsewhere), for, in place of the old flat hearth, a kitchen range had been introduced. One good feature only could my friends see in this room—it had a really fine old oaken floor.

Making my Study—the Fireplace.—It was on the fireplace that I began work. To find a substitute for the kitchen range, I hunted through the old stock of an ironmonger, and for 5s. 6d. bought that grate, of the fashion of forty years since, which appears in Fig. 1. In the days when it was made people had not learned that a room is best warmed by a fire near the floor level, and this grate was intended to be perched six inches higher than met my approval. I therefore caused my mason to bury the lower part beneath the level of the floor. And here I should state that, though I employed a mason to set this grate and the bricks and tiles around it, this was the one and only instance in which any paid workman entered the room.

The reader, as he looks at Fig. 1, may think the arrangement of my grate eccentric. Immediately surrounding it is a course of moulded bricks, which scarcely cost me more than bricks of ordinary shape would have done, but these lead very well to the course of tiles which succeeds them. Mine are old Dutch tiles; I got them from builders who had saved them from the wreckage of ancient houses. Some of them were not thought worth making a charge for, others cost me twopence or threepence each—2s. 6d. in all. But, being genuine old things, they have more interest than costly new Minton tiles could have. As ornaments for the hearth, such tiles, made chiefly at Delft, in Holland, seem to have been introduced to this country about the time of "Dutch William," and they were largely imported during the reign of the first George.

The overhanging of the two end tiles of the top row was a matter of necessity; the alternative lay between that arrangement and cutting a tile in two, but I think it will be admitted that I have so dealt with this difficulty as to make it rather add to the effect than otherwise.

I must also call attention to my fender of stone curbing. This cost me nothing. It is made of waste strips of Portland stone, which I looked out in a mason's yard and had for fetching away. I trimmed off their edges and dowelled and cemented them in place myself. Of the woodwork of my fireplace I must speak in my next paper.

A WORKSHOP GRINDSTONE.

BY ELECTRON.

MOUNTING CONVENIENT FOR ORDINARY ROOM—FRAME, HOW MADE—AXLE—GRINDSTONE—FIXING GRINDSTONE—CAST-IRON BEARINGS—DRIVING-WHEEL AND AXLE—BEARINGS—CRANK—TREADLE—CONNECTING-ROD—SCREWING DOWN FRAME—LEATHER BELT—TRUING GRINDSTONE.

ANYONE having a workshop in an attic, or other room where it is not convenient to have a grindstone, must have felt the want (especially when working at night) of some means of grinding any special tool. The grindstone about to be described may be set in any room, and will be found very useful. A grindstone is sometimes made to fix between the centres of a lathe for any small work, but it is not always convenient to remove work from the lathe to fix the grindstone; and the wet and dirt from a grindstone are liable to spoil a good lathe.

Fig. 1 is a side view of grindstone, to a scale of 1½ in. to the foot. The frame is of wood, 2 ft. 8 in. high. The rails may be any size: 1½ in. by 1 in. will be suitable. They must be made as shown, mortised, glued, and pinned together. Make two frames, equal in size, and fix them 6 in. apart by four rails, which may also be mortised; also fix under each cross-rail a ⅜ in. bolt, passing through both frames, and screwed up with a nut; this will secure them firmly together. Next prepare an axle for grindstone of wrought iron, 8 in. long. The grindstone should be 3 in. or 4 in. in diameter, and if the hole in it be 1 in. square, the thickest part of axle should be forged 1⅛ in. in diameter. A collar must be formed in the centre, about ½ in. deep and ¼ in. thick. The ends should be forged down to ¾ in. in diameter. Turn the axle and bearings true, making the thickest part to fit the hole in stone. Slightly reduce about 1 in. at the outer end and screw it, and fix a nut and washer. When the grindstone is put on, it can be fixed by screwing up tight with the nut and washer. A piece of hard wood should be fixed at the opposite side of the collar, and turned up to form a driving-pulley for flat belt. Fig. 2 is a section of axle.

Next provide four bearings of cast iron, as shown in Fig. 3. The holes may be cast in them, and reamed out to fit ends of axle. Fix two to top of frames by screws.

Next prepare a driving-wheel and axle. The wheel should be about 18 in. in diameter, with a flat rim for belt. A barrow-wheel will make one. The axle for this

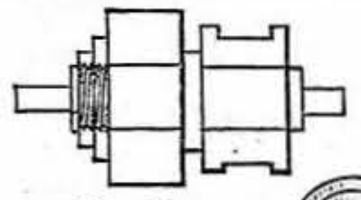

Fig. 2.

Fig. 3.

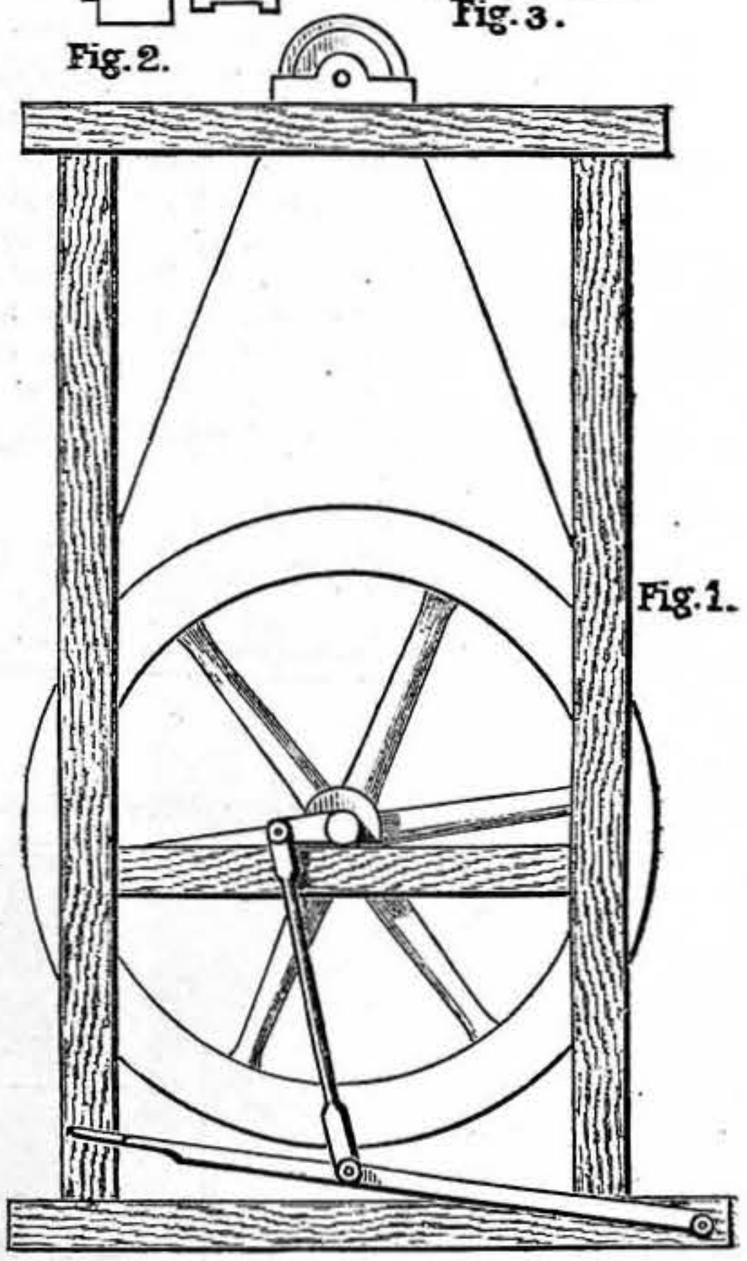

Fig. 1.

Fig. 1.—Side Elevation of Grindstone. Fig. 2.—Axle of Grindstone. Fig. 3.—Bearing.

wheel should be 9 in. long, projecting an inch through one bearing. The wheel may be fixed in the same manner as the stone, or keyed on.

The bearings may be made of hard wood, if preferred, as it will last a long time.

The crank may be of either wrought or cast iron, with not more than 2 in. throw. It must be keyed on the projecting end of axle.

Next prepare a treadle and connecting-rod. The treadle is about 18 in. long, of iron ¾ in. by ¼ in., one end being hammered out for the foot to rest on. It may be fixed to a bolt passing through frames, or to a bearing fixed on the floor.

The connecting-rod has a double end fixed to treadle by a small bolt and pin, and the top end is fixed to crank-pin by a pin and washer. The connecting-rod should be made so that when the crank is at its lowest point the treadle is just clear of the floor, or by using oak or ash the treadle and connecting-rod may be of wood.

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When all is fitted up, the frame may be screwed to the floor, and a flat leather belt fixed on driving-wheel and pulley, and the machine is ready for work.

If the edge of grindstone does not run true, it must be trued by using the end of an old file as a turning tool. A rest may also be fixed on the top of framing to rest the tools on while being ground. Anyone making this machine will find it very useful, and the cost need not be much.

ARTISTIC LITHOGRAPHY.

BY MISS ADA J. ABRAHAM.

PRACTICAL WORK: COLOUR.

NUMBER OF PRINTINGS—TRACING—TALLIES—REGISTER MARKS—GRIPPER—NUMBERING TALLIES—FIRST TRACING FROM PRINTERS—ORDER OF PRINTING COLOURS, ETC.—STRENGTH OF COLOUR—MIXTURES OF COLOURS—YELLOW—BLUE—PINK—BROWN—GREYS—ROUGHING—PRODUCTION OF TEXTURE.

THE first thing to be decided on is the fewest number of printings in which it is possible to reproduce the sketch, which is done by looking carefully over it and finding out which colour it is possible to do without, by mixing two or more of the other colours together to get the desired shade, when the remaining colours will be the fewest number in which the sketch can be reproduced.

Commence by making a careful tracing of the sketch on diaphanie paper in lithographic ink, and as this paper contracts and expands it should not be lifted uutil the whole tracing is finished; all the corners should be gummed to the sketch, and if necessary a piece of white paper can be slipped between to see the effect of the tracing. Draw the outline, and mark any different colours it may contain in very clear, steady lines, making the lines of the outline rather thicker than the others, so that the different objects can be easily distinguished, then every variety of colour and difference in light and shade should be drawn in dotted lines. Six little squares, technically termed "tallies," should be drawn at the side of the drawing, and three little crosses made at the top and bottom, to use as register marks. One would be sufficient, but it is usual to do three or even more. Fig. 34 is a facsimile of how the tracing of a humming bird and leaves should look when finished; and as it is impossible in WORK to give coloured drawings, I must ask the reader to accept as illustrations the few following diagrams, being the black impressions of the different colours which were worked from an original water-colour drawing.

The crosses or register marks enable the printer in proving to fit the different colours exactly one over the other, and they should be ruled in lithographic ink on each stone. The colours are registered by means of pins; for instance, in the gold stone, that being the first, the impression is taken, when of course the crosses will print at the same time; then for the next colour, say the yellow, the printer takes two pins, pricks a hole in the centre of the two middle crosses, and makes a slight hole in the duplicate ones on the stone. He then, holding the paper in his hand face downwards with the pins, places them in the holes on the stone, thus pinning the paper to it, then removing the pins, the paper is left flat in position on the stone, and the proof pulled. Thus, if blue were printed over yellow, a green cross should be the result; and so on with each colour.

In machine printing the register marks are done away with, as the gripper (a piece of metal that catches hold of and places the sheet of paper in the right position on the stone) answers the same purpose; therefore in placing a drawing on the stone that is intended to be printed in the machine, about ½ in. on one side should always be allowed for the gripper. This edge of the stone is bevelled, and cannot be worked upon. Supposing a sketch, A B C D, were required to be drawn on a stone, E F G H, it should be placed in the position indicated in Fig. 35, E F being the gripper edge.

The tallies should be numbered, and on the first stone No. 1 must be ruled up and filled in solid, with the name of the colour written underneath, the reverse way, and the same done with each of the other colours on the different stones, using a separate square for each colour, so that when the drawing is being proved, the artist can tell the exact shade that has been used, and so have it altered, either lighter or darker, warmer or colder, as the case may require it; and when a correct finished proof is obtained, the printer can be told to follow the exact colour of the tallies for the machine impressions, as the drawings are proved by hand which the artist superintends, and printed by machinery.

The drawings in the next page are worked in chalk, but the same rules should be

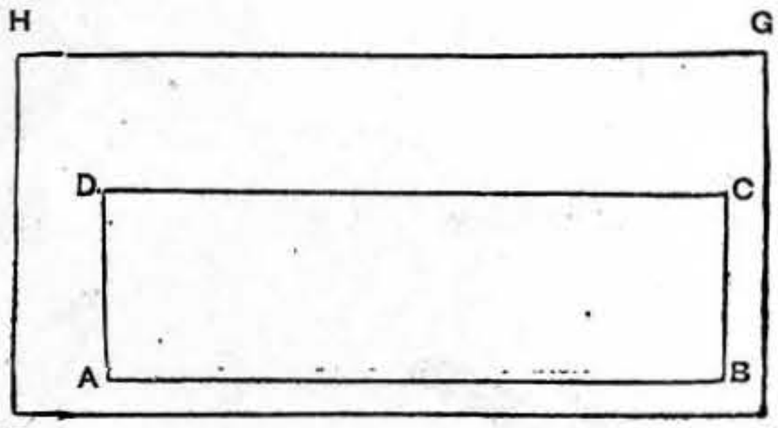

Fig. 35.—Correct Position of Work on Stone.

followed were they done in stipple, and if a great number were required it would be necessary, to enable them to be transferred to a large stone, and perhaps a dozen or even more printed at the same time. After the tracing is made it should be sent to the printers without delay, as it does not keep longer than a few days, and therefore, unless transferred to stone at once, will not go down.

Having received the stones with the red tracings on from the printer, the register marks and tallies should be ruled in first in case they might be forgotten, and the name of the colour to be worked written on the stone so as to read legibly in ordinary writing ink, besides that underneath the tally, in order that the printer can easily distinguish which stone is meant for the colour he desires to print. This writing being in ordinary ink will not print, but will mark the stone, and thus can be always read.

In any drawings containing gold, silver, or bronzes, these colours should invariably be printed first, as they are what are termed "dusting colours"—that is, printed in an adhesive ink, and the powder colour dusted over it; and as this powder flies about, if printed afterwards it would perhaps stick to the other colours in places where it was not required.

In drawings which contain no dusting colours, the yellow should be the first colour worked and printed, as it is a body colour. It does not require such finished work as some of the other colours, although the right strength as to light and shade should be drawn on the stone, and it should be worked with an open texture, being a colour that is likely to clog up in printing.

To work this or any other colour, make a pattern of the colour intended to be printed in water colour, and pick out every part of the original sketch that contains that colour as strong as, or stronger than, the pattern. Those parts should be put in solid on the stone, and any places with the same colour that are in the slightest degree lighter must be tinted accordingly—a very strong tint if it be only a shade lighter, and a light tint if in the sketch the same colour is very much lighter than the pattern.

A good way to judge the necessary strength the colour to be printed should be, and also the strength to work the different tints on the stone, is to take that part of the drawing that is the nearest approach to the pure colour and match it as nearly as possible for the pattern to work from; then take two pieces of white paper, and cut a hole in the centre of each; then by holding one over the sketch excluding the surrounding colours, and one over the pattern, it will be easily seen whether solid or tinting is required to be drawn. In this way a great variety of shades can be obtained from the one colour. The student must remember that wherever the least shade of that colour appears in the original sketch, a corresponding tint of the necessary strength must be made on the stone, for it cannot be put in afterwards unless an extra colour be used; and here the artist's knowledge of colour should assist him in judging what colours mixed together in certain proportions produce the necessary and desired effect.

Everyone knows that yellow and blue mixed together produce green, and therefore a green colour need not necessarily be used in a chromo, but can be obtained by printing blue over yellow. In the same way purple can be produced by printing blue over red, or *vice versâ*, orange by red over yellow, etc. etc., but it must be brought before the student's notice that blue printed over red produces a purple colder in tone than if the red were printed over the blue, and the same applies equally to any other mixture of colours.

Fig. 36 is an impression taken from the yellow stone, and it must be remembered that it would appear much darker on the white paper than in the finished sketch; this is because it is the only colour, whilst in the finished proof it is thrown back, and a good deal covered by the darker ones.

Although two separate printings were required for the gold and yellow, still only one impression of the two colours is here shown, as they do not interfere with each other. The diagram is also a good specimen for showing the result of two colours not being registered correctly.

After the stone is finished it is required to be etched, as previously stated, an impression taken, and all mistakes rectified before any further proofs are pulled.

The blue (Fig. 37) could be worked next, and requires a little finer and better work than the yellow, especially if, as in the present instance, only one blue is used. These two colours will give all the blue, yellow, and green tones necessary to the picture.

The pink (Fig. 38) also requires a nice piece of work, unless the subject was such that one or two reds were going to be used, in which case reserve the good work for them, only putting the necessary quantity as regards light and shade in the first pink.

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This colour used with judgment, coming on the top of the blue, gives an excellent grey. We now find that from these three colours a great many varieties are obtained, such as a pale purple, orange, light greys, in different tones, light browns, etc.; and at this stage of the work it is advisable that the artist should have a proof, as far as it has gone, before him, as well as the sketch, and, by continually comparing one with the other, so judge the necessary quantity of work to put in the remaining colours. He may find that in some parts the pink and blue will give a grey dark enough without any additional work therefore when the grey stone is worked no tinting will be required in those places.

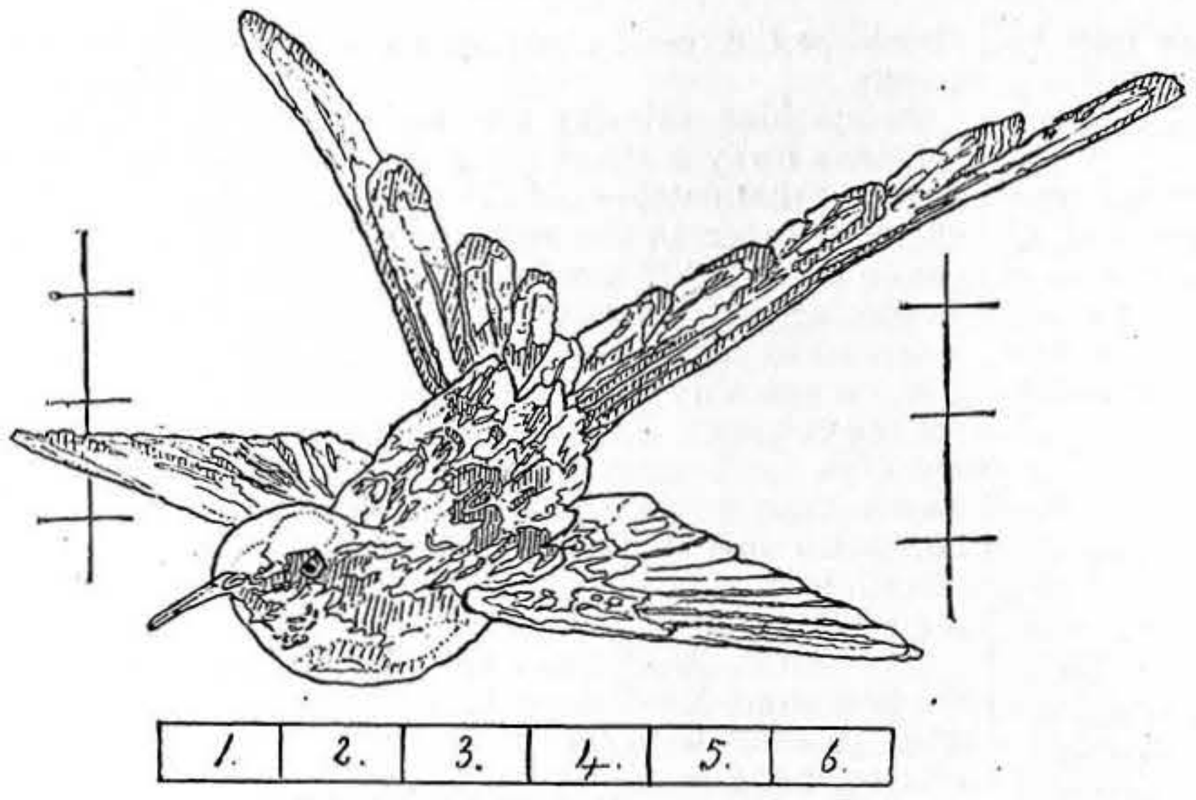

Fig. 34.—Tracing of a Humming Bird.

The brown stone (Fig. 39) generally does the drawing, and is, therefore, a very important colour. It generally requires a slightly different treatment in working to the other colours, and should be done as early in the work as possible, especially in large subjects, so as to give force to the picture.

The greys should be worked last, and will, therefore, tone down all the bright colours, bring the whole drawing into harmony, and generally finish it (see Figs. 40 and 41). The light greys need not be worked as carefully as the darker ones, only the tone and not the work showing. This

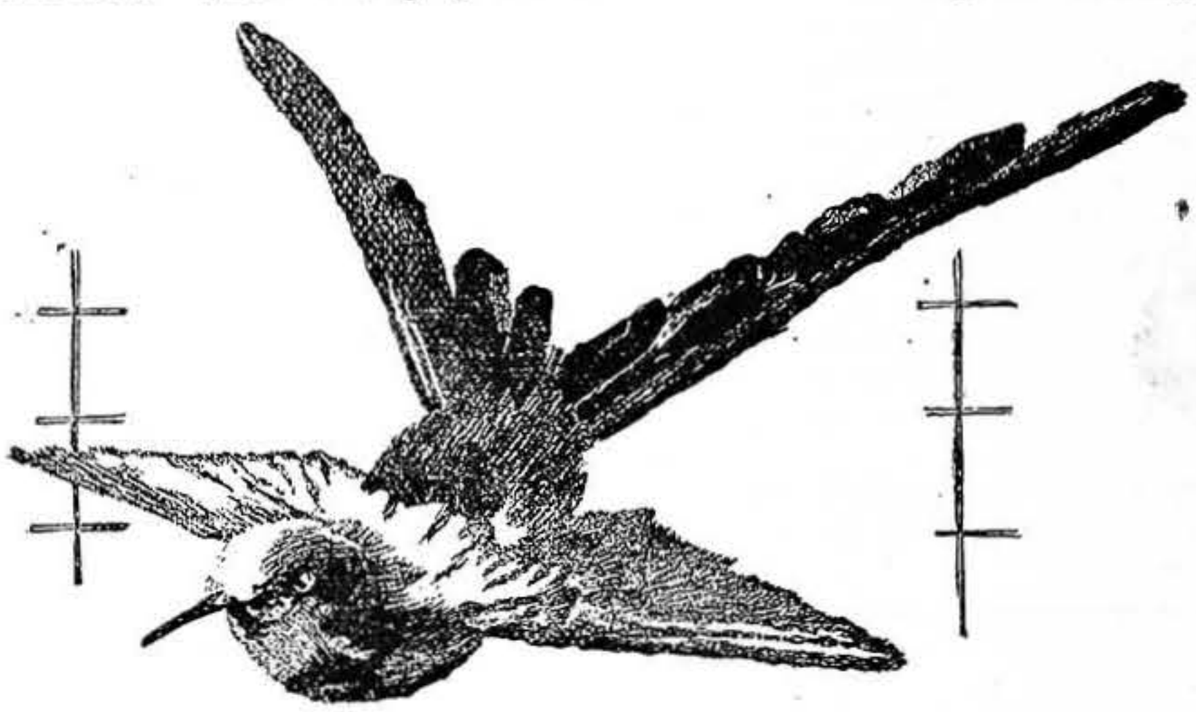

Fig. 36.—Black Impression from Yellow Stone.

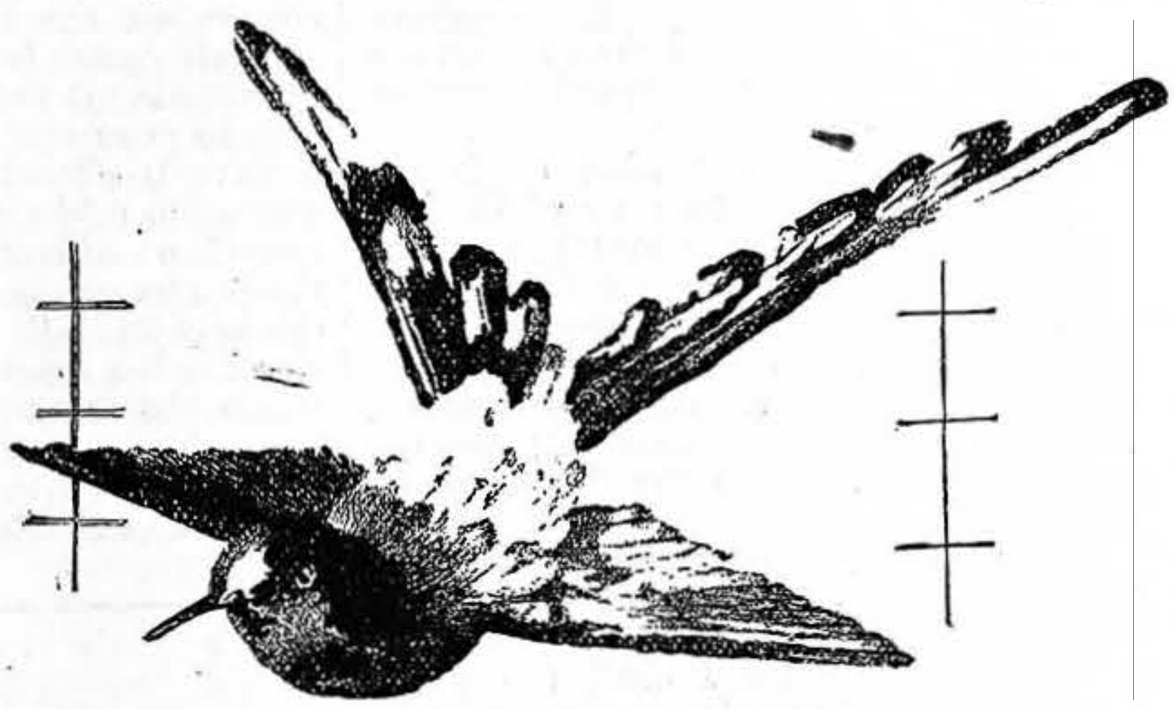

Fig. 37.—Black Impression from Blue Stone.

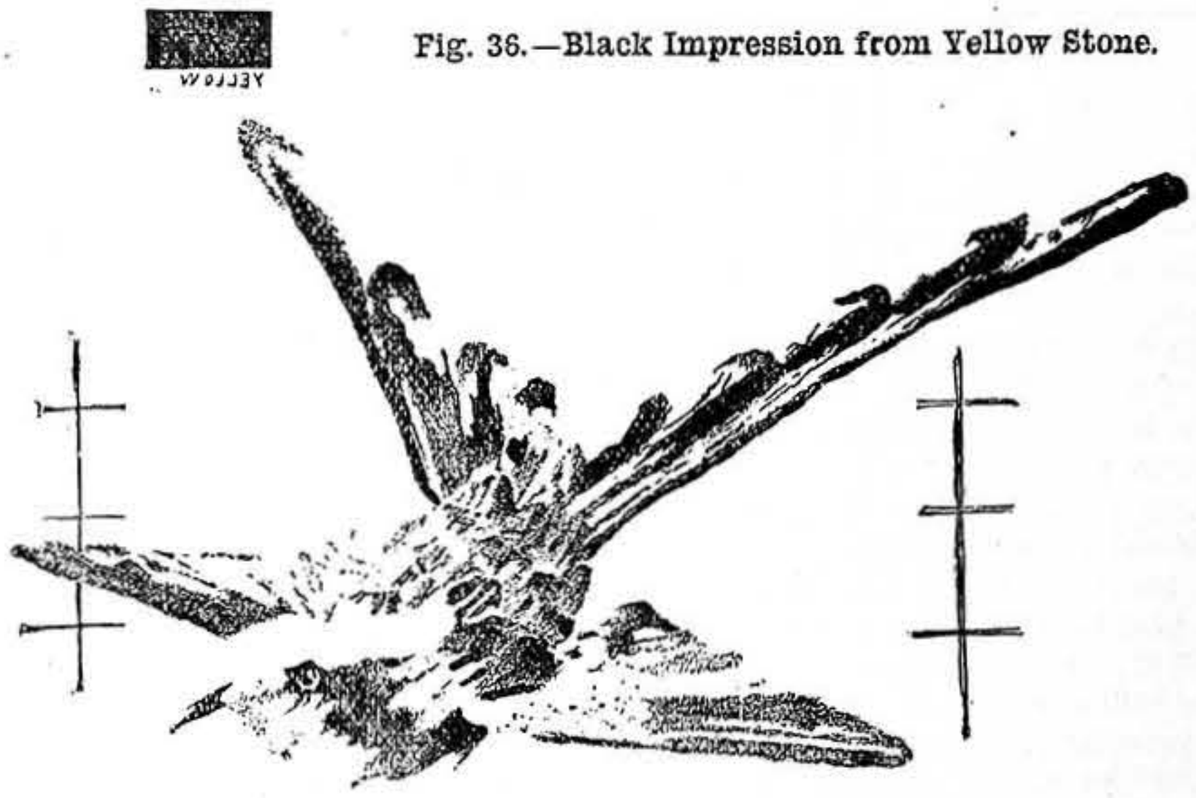

Fig. 38.—Black Impression from Red Stone.

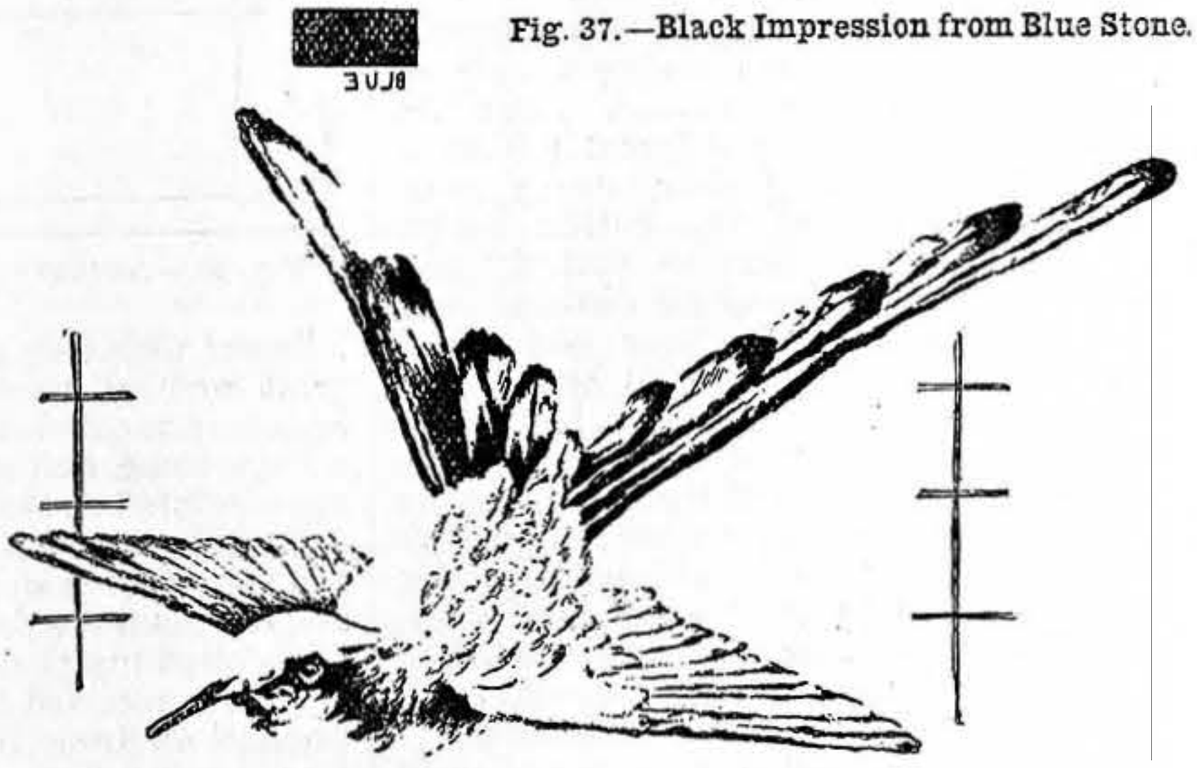

Fig. 39.—Black Impression from Brown Stone.

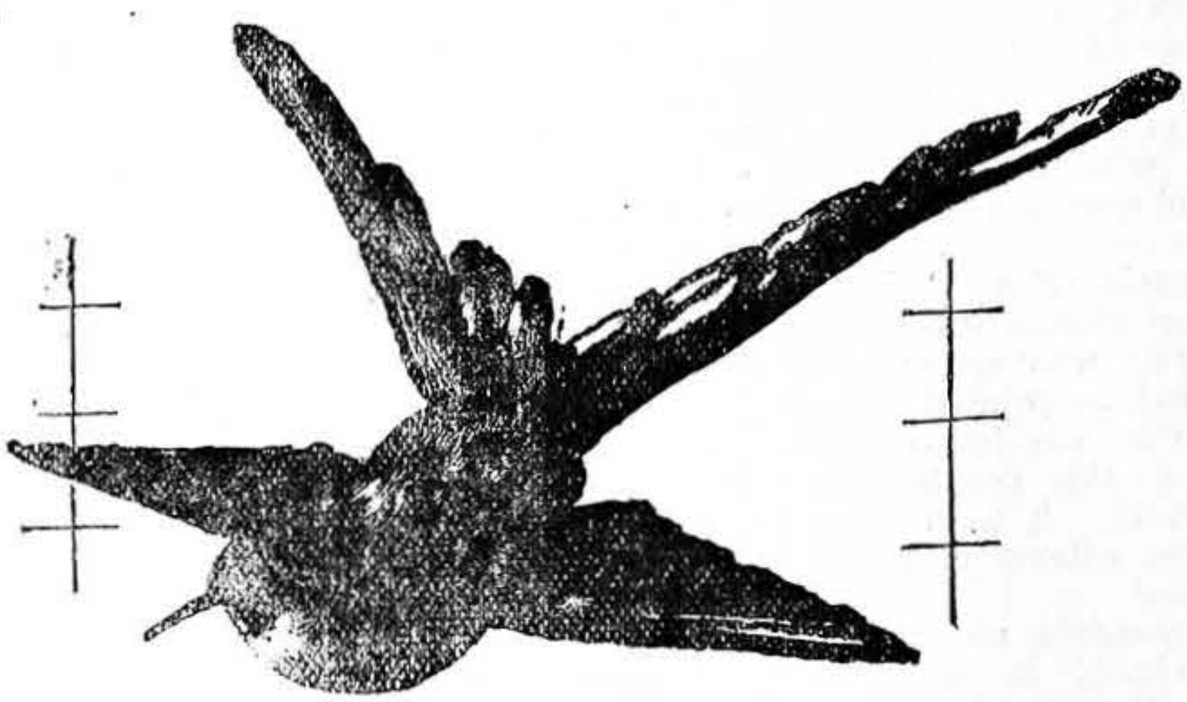

Fig. 40.—Black Impression from First Grey Stone.

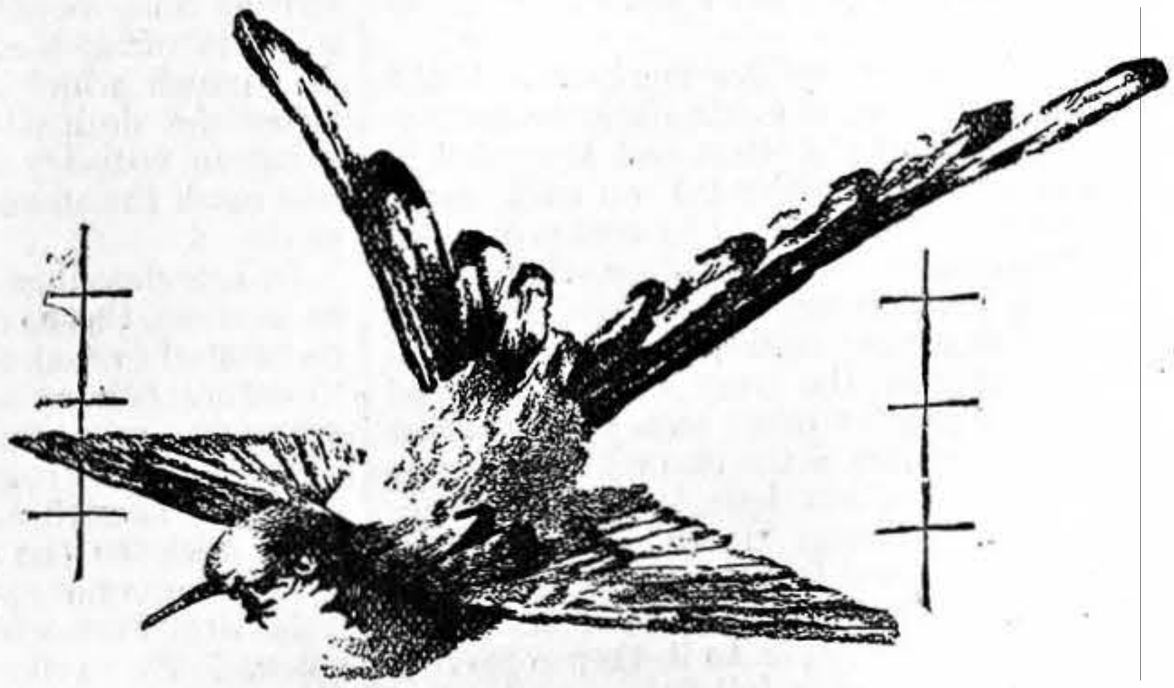

Fig. 41.—Black Impression from Second Grey Stone.

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applies equally well to the blues, reds, etc., but the student will soon find out on which stones the best workmanship should be put, and on which to spend the most time. Although it is necessary to do the work as quickly as possible, especially in the light colours, still, it should never be scrambled.

After the picture is entirely finished, it is sometimes roughed—that is, an artificial surface is given to it in imitation of water-colour paper, canvas, etc. This is done in the printing department by inking a grained stone, and then etching it with strong acid. The coarser the texture is required the more the stone should be etched, this being sometimes done as many as three or even four times. Another way is to ink a stone and take an impression upon it from the sheet of paper, canvas, etc., which it is intended to imitate, and which must have been first prepared with gum; then etch the stone in the ordinary way, only stronger, and if the chromo be damped, laid on the stone, and pulled through the machine, it will come out marked as required. In this way any kinds of texture can be copied. The marks of the brush in an oil painting can be imitated in the same manner, by gumming a stone in those parts where they appear, then etching it according to the depth required, and pulling an impression.

There are a great many subjects appertaining to lithographic work which it is simply impossible to touch upon in these papers, such as varnished chromos, photo-lithographs, transfers, and many others; but the above hints on the general principles of the art of lithography in reference to drawing on stone I trust will be of assistance to the student of this very interesting and useful art, and perhaps in some future work I may (subject to the approval and leniency of my readers) enter deeper into the subject of lithographic drawing.

A USEFUL METAL LATHE.

BY SELF-HELPER.

INTRODUCTION—STYLE OF LATHE CASTINGS—HEADSTOCK PATTERN—PULLEY PATTERN—THE BED—POPPET PATTERN—HAND-WHEEL PATTERN—HOLDING-DOWN PLATES—FLY-NUTS.

I WAS permitted in former numbers of WORK to describe two lathes which were of rather simple and makeshift character. One was the primitive dead-centre lathe which might be made by almost anybody who could handle tools, while the other was more elaborate, but still formed principally of wood. Judging from the number of queries which I have received relative to them, I believe that a paper describing how to make an iron lathe will be acceptable to numerous readers of this Magazine. Iron possesses many advantages over wood as a material for lathe-making, the principal being that it is uninfluenced by the weather. We need never fear that the mandril of an iron lathe will stick through the swelling of the headstock by damp. An iron lathe is also lighter-looking and much more graceful than one made of wood, which must ordinarily be rather ponderous-looking and unsightly.

In this paper I will endeavour to write for those who know very little about engineering and carpentry, and if I appear too simple to some, I will ask them to consider that there are other readers of WORK who are not as clever as they, and who must be catered for.

At the very outset two questions suggest themselves to us—namely, what size shall the lathe be, and where shall I get castings? There are, I think, two classes of lathe users. The first, who want only a table lathe, would embrace boys and those who require the machine for the production of very small pieces of turnery, such as are used to decorate fretwork and small articles of joinery. For this class, a lathe whose centres are two inches and a half or three inches from the bed would be suitable; and such a lathe might be easily carried in a large box and mounted on the lid when in use.

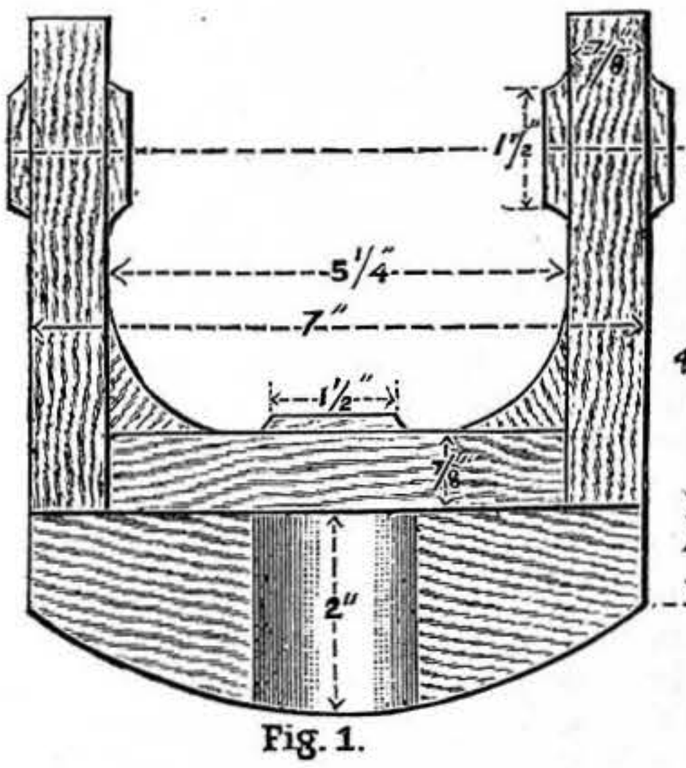


Fig. 1.

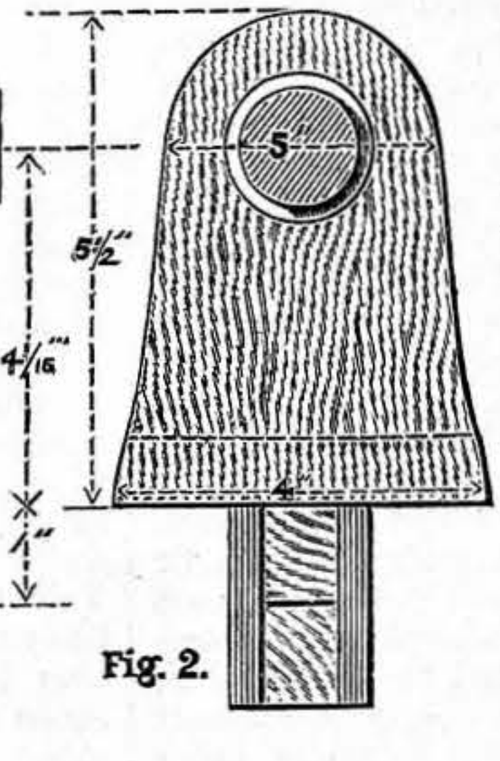
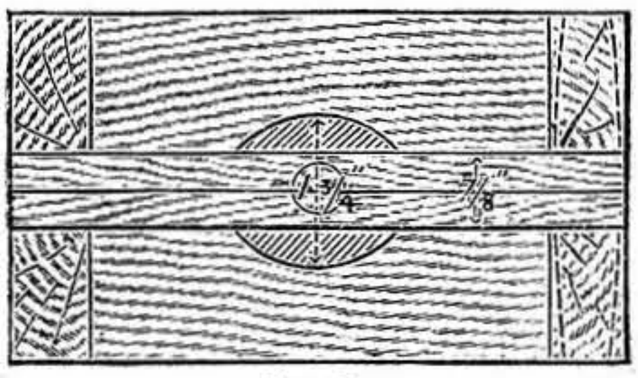


Fig. 2.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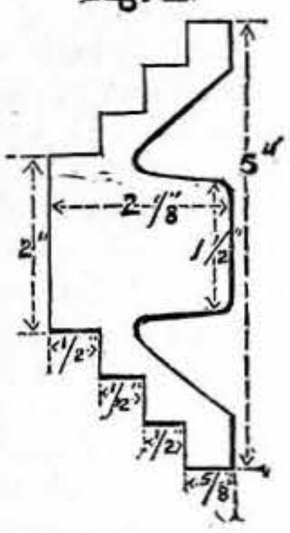

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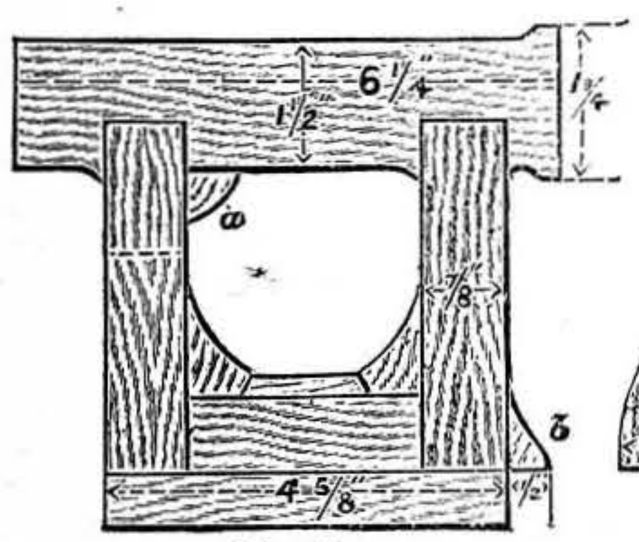

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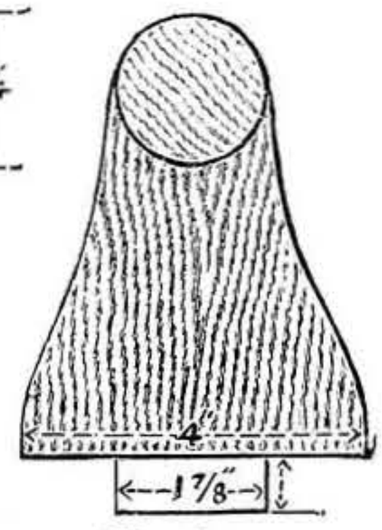

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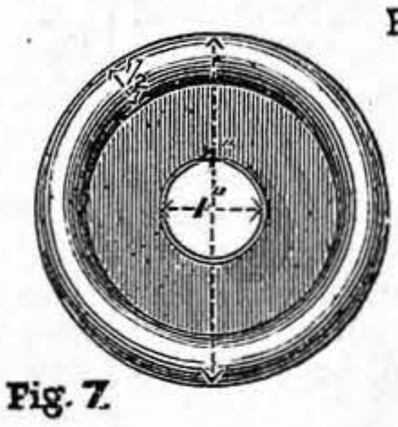
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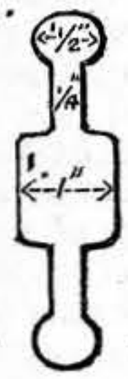


Fig. 8.

Fig. 9.

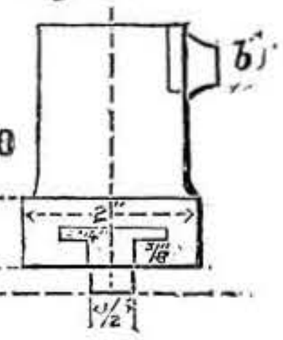
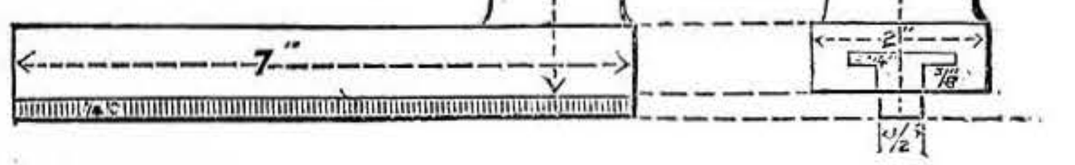
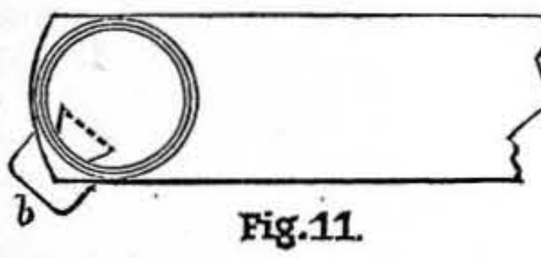


Fig. 10





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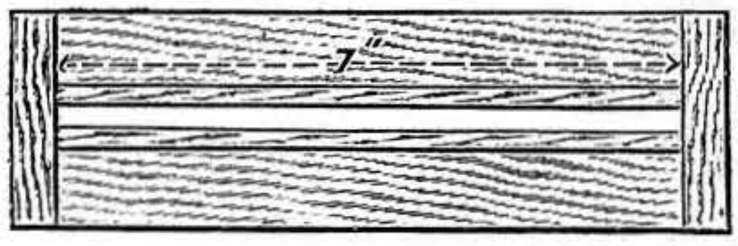

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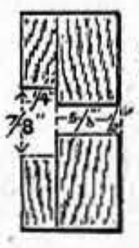

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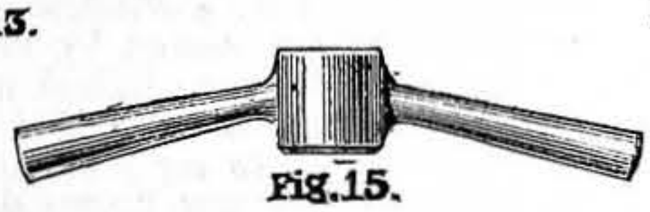
Fig. 15.

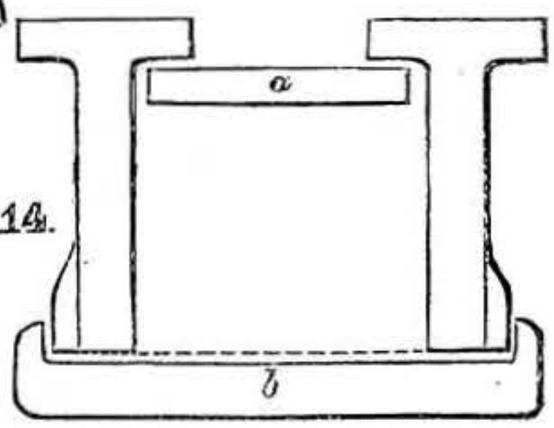

Fig. 14.

Fig. 1.—Headstock Pattern (Side View). Fig. 2.—Ditto (End View). Fig. 3.—Ditto, as seen from below. Fig. 4.—Sectional View of Pulley Pattern. Fig. 5.—Poppet Pattern (Side View). Fig. 6.—Ditto (End View). Fig. 7.—Hand-wheel Pattern (Side View). Fig. 8.—Ditto (Sectional View). Fig. 9.—Hand-rest Socket (Side View). Fig. 10.—Ditto (End View). Fig. 11.—Ditto (Plan). Fig. 12.—Core-box (Plan). Fig. 13.—Ditto (Section). Fig. 14.—Section of Lathe-bed, showing two Sorts of Clamping Plates. Fig. 15.—Fly-nut. All Figures drawn to Scale of 3 in. to 1 ft., or quarter size.

In the second class of lathe users I would place all those who have room enough to keep the lathe as a separate machine, and I would not recommend such to have less than four inches intervene between the lathe centres and its bed.

Table and bench lathes are usually mounted on short legs four or five inches long, by which they are fastened to the bench or table, the fly-wheel having a separate existence; while in the other class of lathes, which I believe has no distinguishing name, the fly-wheel, treadle, bed, and headstocks are all secured to the same legs.

In this paper I will take the four-inch centre lathe for my model, but it will be easy for anyone to make a lathe of a different size just in the same manner, always remembering that everything must be reduced or enlarged nearly in the same proportion. I would say a word of caution to those who think of making a very tiny

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lathe, and expect to have it in every way as perfect and efficient, for its size, as a large one. It can be made as perfect, nearly, but it will not be as efficient: neither would a miniature man-of-war. Such a lathe would be almost as troublesome to make as one of a larger size, and would not be anything like as handy or as useful. My advice, then, to the readers of WORK is: If you have room for it, make a lathe of four-inch centre such as I will describe in this paper.

With regard to the next question—Where can I get castings?—my advice would be to send your own patterns to the foundry and get castings off them. That is what I generally do myself, and I find it pays, not alone in cheaper castings, although this is also the case, but the experience in pattern-making is valuable, and the consideration of the various stresses to which the tool will be subjected when finished, and the provisions made to resist them, are useful exercises in theoretical and practical mechanics. While, however, this is true for me, others might find it more convenient to purchase the castings ready to work up, and it is not difficult to do so now, as most lathe-makers are sensible enough to supply castings at fairly moderate prices. A glance at the advertisement sheets of WORK would give addresses of makers, and I shall be always happy to supply information to those who seek it through "Shop."

To make this four-inch centre lathe *easily*, the use of a good six-inch centre lathe, with slide-rest, also planing machine or shaper, would be necessary; but it can be made *successfully* with a much smaller outfit, consisting, at the least, of a hammer, cold chisel, file, some sort of lathe (the dead-centre one I formerly described would do), and a machine capable of boring a hole $\frac{7}{8}$ in. in diameter through cast iron. To this I must add screwing tackle.

We will begin by making the patterns for the two headstocks, pulley, hand-rest socket, ties, and clamping plates. They should be made of yellow pine or mahogany, and carefully finished with sand-paper. If they were required as stock patterns they should get five or six coats of varnish, but as we only want one set off them they will do very well without. I may mention here that "off" is the technical word used to express that castings are required from these patterns.

The patterns for the headstocks, pulley, hand-wheel, clamping plates, and tees are exactly like the castings, but the hand-rest socket differs somewhat, and will require a core-box.

Headstock Pattern.—Figs. 1 and 2 represent the fixed headstock pattern. It will be seen that the vertical ends are nailed firmly to the baseboard, and the corners filled in with pieces of wood which act in the double capacity of strengthening the casting and making its contour graceful. The bosses towards the top are to lengthen the bearing for the mandril. It will be noticed that the centres of these bosses are $4\frac{1}{16}$ in. from the base; the extra $\frac{1}{16}$ in. is to allow for the shrinkage of the metal and for chipping and filing the base flat. The bridge-shaped piece underneath is to strengthen the base; note that this piece itself is in turn strengthened where the holding-down bolt will pass through by putting a piece at each side, as shown in Fig. 3.

A matter of great importance in pattern-making is taper. All patterns should be smaller in the parts which go deep into the sand, so that they can be withdrawn without breaking the mould. The dotted lines in Figs. 2 and 3 show, in a much exaggerated scale, how taper can be given to these patterns. It is only necessary to have the centre of each part slightly thicker than its edges: $\frac{1}{32}$ in. would be quite enough.

Pulley Pattern.—It is well worth considering whether the pulley for this lathe ought to be of wood or cast iron. If the latter is used, it will be found to be by far the most difficult piece of metal-turning in the entire job, and should not be lightly undertaken. However, as I have already described a wooden pulley, I give in Fig. 4 a drawing of the pattern required for a pulley such as we will use in cast iron. The hollow at one side is to lighten it, as if made solid it would be inconveniently heavy. The pattern would be turned out of a piece of mahogany $2\frac{1}{4}$ in. thick, well sand-papered, and having the steps tapered so as to leave the sand without difficulty. I prefer gut to a flat belt as a driving band in a lathe of this description, which will be used mostly for wood and light metal turning.

The Bed.—It will be necessary at this stage to consider what sort of a bed will be used for this lathe, and where it is to be got. I would not advise the amateur to make a pattern of his bed for the following reasons: first, it takes a large quantity of valuable wood, for not alone must the pattern of the outside be made, but a core-box for the space inside must also be supplied. Then, when the bed is cast, it must be planed, and as they cannot usually do that at the foundry, it must be sent to an engineering establishment, and the cost will be great—so great, that a bed could be got from R. A. Lee, High Holborn, or some other maker, ready for the headstocks, for almost as little as the planing would amount to. An amateur might, indeed, file a bed fairly true, but the work would be very long and tedious, and straight-edges, surface-plates, and other expensive tools would be actually requisite. If any of my readers, however, wish to have a description of a lathe-bed pattern, they have only to ask for it through the proper quarter, and I will be happy to supply it.

A very common practice is to mount iron headstocks on a wooden bed whose upper surface is protected by plates of flat iron screwed firmly to it, and filed true on top and edges. This plan I would heartily recommend to my amateur and apprentice friends. At any future date, if they are found to be worthy of it, the headstocks could be mounted on a more permanent base. In any case, I will go on the supposition that the space between the two sides of the bed is $1\frac{3}{4}$ in. wide. I now pass on to the

Loose Headstock or Poppet Pattern.—It is shown in Figs. 5 and 6. I usually begin by preparing the upper cylindrical part, which is 6 in. long and $1\frac{1}{2}$ in. in diameter when finished. One end is enlarged somewhat to take the disc, which will be screwed against it. I cut spaces in this, half through, for the supports to fit into tightly. I find this plan much easier than cutting a semi-circular hollow in the vertical pieces would be.

The only thing to note in this pattern is to have all the corners nicely filled up with putty. The piece *a* should be carefully put in so that when the locking-bolt is passed through it will not weaken the support too much. The piece *b* need not necessarily be there at all, but it will serve to make the supporting base larger. The tenon which is eventually to go between the sides of the bed will be $1\frac{3}{4}$ in. wide in the pattern to allow for shrinkage and fitting.

The Hand-wheel Pattern (Figs. 7 and 8) can easily be turned from a piece of mahogany 4 in. in diameter and 1 in. thick. I show it without spokes, simply a disc, but spaces could be cut out by anyone who does not mind the trouble. Hand-wheel patterns can be got at most foundries.

Hitherto, all the patterns have been just as the castings will be. In the hand-rest socket pattern two new features in pattern-making become prominent. The first is the piece *b* (Fig. 10), which should be loose, simply held on by a pointed piece of wire; or, better still, let down from the top with a dovetail as shown by the dotted line in Figs. 10 and 11. This piece is placed at an angle of 45 degrees with the length of the socket, as is seen clearly in Fig. 11. We want a slot cast in the socket base like that shown by the dotted line in Fig. 10. This could be managed only by means of a *core*, which I will now endeavour to explain.

A slip of wood the exact width which the slot is required to be is nailed centrally along the base and its entire length. This is called a *core-print*. We next require a *core-box*, which is shown in Figs. 12 and 13. It is made of four strips of wood nailed together as shown, and two other pieces tacked to the ends to keep them the correct distance apart. The moulder fills the space with sand pressed firmly together and mixed with some liquid which makes it quite firm and hard. When dry it is a T-shaped strip of sand, which is placed in the mould in the space made for its reception by the print. When the casting is made the sand can be shaken out, and in its stead will be the T-shaped recess or slot.

A couple of tees had better be cast, as they are cheaper than wrought-iron ones. The stems will be 3 in. long and $\frac{7}{8}$ in. in diameter, and the horizontal pieces tacked to them $\frac{1}{4}$ in. thick and $\frac{7}{8}$ in. wide at the centre, tapering to $\frac{5}{8}$ in. at the ends. They may be 8 in. and 4 in. long respectively. The tees used for iron-turning are flat on top, and could easily be made by nailing flat strips of wood $\frac{1}{2}$ in. thick on the ends of the stems.

The Holding-down Plates may be made of either wrought or cast iron. Their shape will depend somewhat on the construction of the lathe-bed. They are mostly pieces of wrought iron having the ends slightly turned up and the space between wide enough to embrace the underneath surface of the bed. Sometimes, however, they just clamp the upper cheeks. In Fig. 14 I give the section of a lathe-bed with the two sorts of clamping plates, shown at *a* and *b*. That at *a* would pass over any stays which might be cast in the bed, but should either be screwed tight from above or have a nut attached to a tube and handle to clamp it; *b* is suitable for a plain bed without stays.

The last pattern we will require is one for *Fly-nuts*, about the easiest of which to make is shown in Fig. 15. The centre boss is turned, as are also the arms, and they are driven into holes bored into the boss. The point of juncture is then filled up nicely with putty. The arms need not be quite as long as shown in the figure, but I like to have a good purchase. It would be as well to get a plain round disc cast also. It is to fit at the end of the poppet, and will be $\frac{1}{4}$ in. thick and $1\frac{7}{8}$ in. in diameter.

If any of those who follow my instructions in lathe-making will construct all these patterns nicely, well enough to please the moulder, they will get some useful practice in joinery which will pave the way for more important undertakings, and teach

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them a good deal about the various parts of a lathe.

I will suppose that they are now sent to the foundry, and in my next article describe what is to be done when they are returned with the castings.

HOLDFASTS FOR WOOD-CARVERS, ETC.

BY OPIFEX.

ORDINARY CRAMPS — OBJECTIONS — SUGGESTION No. 1—SUGGESTION No. 2.

Ordinary Cramps.—One of the first essentials to success in wood-carving is the possession of some efficient means of holding the work steady and solid upon the bench, table, etc., and, as far as my experience goes, the cramps to be had in the tool market are inadequate; at least, I have not been fortunate enough to find, either in the shops or in any of the numerous illustrated price lists advertised, any appliance of this nature which is entirely satisfactory. This, I grant, may be my misfortune, or my fault, or both, and the "very thing" may be easily obtained by one who knows where to look. Be this as it may, however, pending the discovery, I have had recourse to several devices from time to time, some of which have been rather successful, and I therefore venture to offer two of them, by means of the accompanying drawings, to any reader who may require such things, and who, like myself, rides his hobby in fields remote from those centres of attraction, the tool shops.

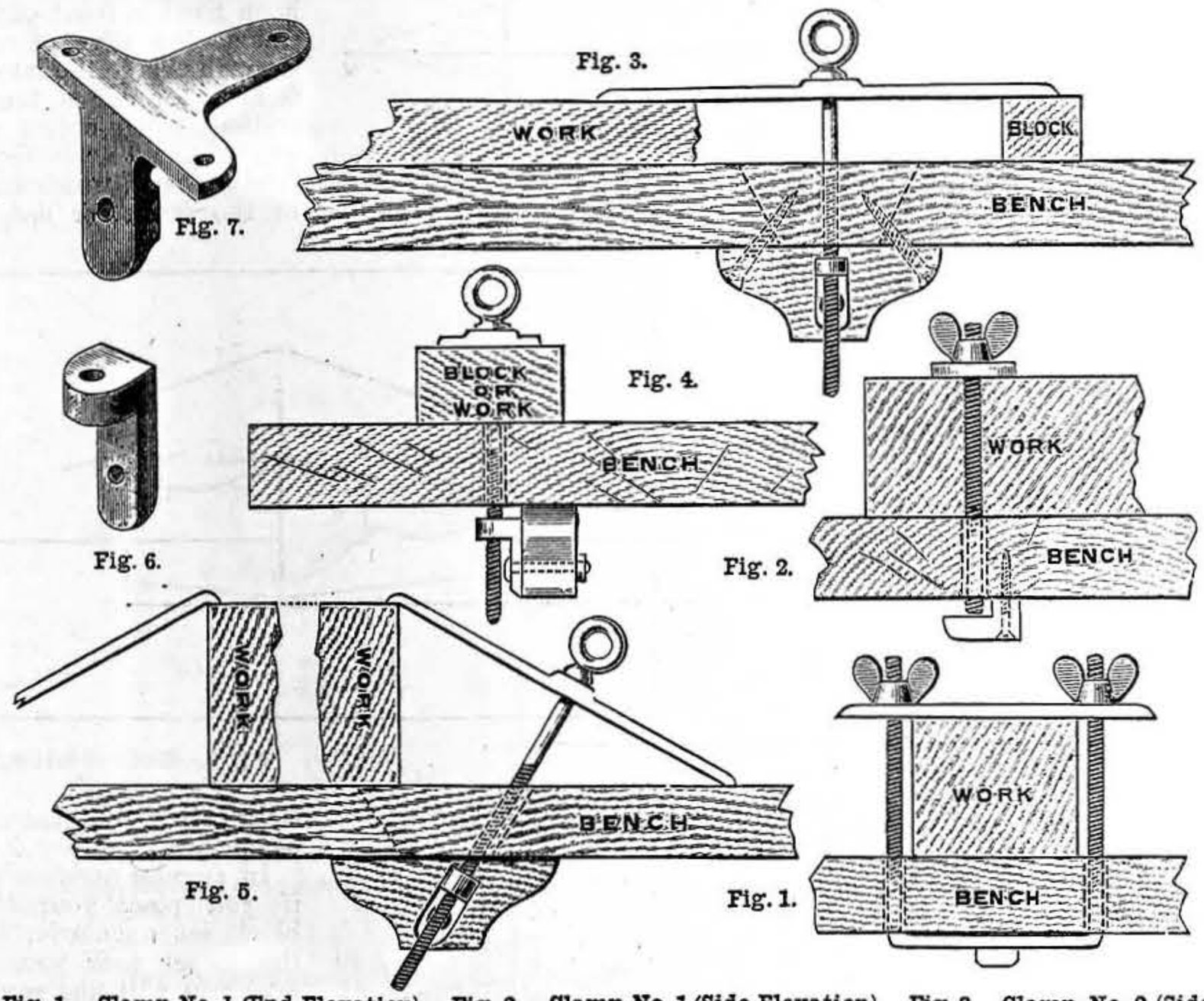

Fig. 1.—Clamp No. 1 (End Elevation). Fig. 2.—Clamp No. 1 (Side Elevation). Fig. 3.—Clamp No. 2 (Side Elevation, showing details). Fig. 4.—Clamp No. 2 (End Elevation). Fig. 5.—Clamp No. 2, showing Method of using two Clamps. Fig. 6.—Sketch of L-Piece. Fig. 7.—Suggestion for Cast Bracket. Figs. 1, 2, 3, 4, 5 are on Scale of 1½ in. to 1 ft. Figs. 6 and 7 are not drawn to Scale.

The chief objections to the ordinary clamp or cramp—which is it?—are that it does not reach far enough, that it is more or less "wobbly," and that it can only be applied at or near the edge of the bench, etc., whereas it is often desirable to apply pressure to a point altogether beyond its reach, especially in wide and thin subjects.

Suggestion No. 1.—Fig. 1 represents an old and, to me, a valued friend, or rather one of a pair, which I have found very useful for many purposes other than carving.

These are easily made, and are very suitable for holding long and narrow work—say, from 6 in. by 6 in., and any length down to the thinnest stuff.

To make the pair we only require two pieces of ½ in. round iron, of good quality, and about 27 in. long; run a good screw thread on each side, six or seven inches in length. Bend at right angles at points 10 in. from the ends, and provide for suitable thumb-nuts; also two plates of ⅜ in. by 1½ in. iron, 9 in. long. Drill out holes seven inches apart, or to suit the exact width of the clamps, and sufficiently large to allow the threaded ends to pass freely through.

Fig. 2 explains the method of using these clamps, from which it will be seen that each clamp requires two holes through the bench, and also a button of hard wood of any kind to prevent the clamps from falling through, but which allows of their removal when not in use.

Suggestion No. 2.—Figs. 3—5 will, I hope, give the reader a correct idea of the construction and mode of using another form of clamp, which will also be found effective by wood-carvers and wood-workers generally.

In its simplest form it consists of an L-shaped piece (Fig. 6) of cast iron, pivoted to a hard wood bracket, which is attached by strong screws to the underside of the bench.

A threaded rod of ½ in. round iron, provided with an eye and shoulder at the upper end, passes through ¼ in. by 2 in. by 10 in. steel plate and through a tapered slip or mortise ⅝ in. wide and about 5 in. long at top, tapering to 3 in. at bottom.

The L-shaped piece is accurately tapped to suit the threaded rod, and is held in position by a ⅜ in. cheese-headed bolt and nut passing through the wood bracket.

The cramp may thus be applied to work in a horizontal position, the other end of the plate being levelled up with a block of wood, etc., as in Fig. 3, which is a front elevation, and Fig. 4, end elevation; or the clamp may be applied to the work at an angle, as in Fig. 5, the pivoted L-piece and tapered opening allowing the pressure of the rod to be applied at right angles to the plate.

Another similar clamp may be placed in line at a suitable distance upon the bench, when, if several plates of different lengths are provided, the pair may be applied to various sizes of work in the manner suggested at Fig. 5.

The "weak spot" in the appliance as described above is the wooden bracket, and although I have found it work very satisfactorily for a considerable time, I can only regard it as a makeshift, and therefore recommend a casting something like Fig. 7, which, with the other parts as already described, would make a good and reliable bench holdfast.*

STAGE PERSPECTIVE.

BY WILLIAM CORBOULD.

OBLIQUE OR ANGULAR PERSPECTIVE.

MY last article finished with the first rule in perspective; we now come to the second: oblique or angular perspective. The difference between the two rules is that in the first rule the point of sight is invariably fixed in the centre, but in the second rule the point of sight may be shifted to the right or left of the centre of the horizontal line; the points of measurement, *a*, *a*, in Fig. 4, become the vanishing points, all receding lines above and below the horizontal line falling into those points.

In Fig. 4 in the next page, if you were to place a square block with one corner towards you, it would appear in oblique perspective. Should you wish to represent a building, or anything perfectly square, you would draw your first perpendicular line, *b b*, then the base line, *c c*. Supposing your block to be 10 ft. square, you must mark 10 ft. from your perpendicular line each side to points at *c*, *c*. From the front corner draw a line to vanishing points, *a*, *a*, on the horizontal line, A A; this would be the ground line of your block; the height, of course, would be 10 ft. marked on the perpendicular line, *e*, it being a square we are working with; but a building might be any height. When the proper height is settled, a line drawn from that point, *e*, to the vanishing points, *a*, *a*, gives the top perspective line of the block or building. To find the proper perspective of the two sides, draw lines from dots, *c*, *c*, on the base line each way to points, *a*, *a*, on the horizontal line; where the lines intersect the ground line, *d*, *d*, you place the two perpendicular lines,

* Since this paper was in type, the suggestion in the last paragraph has been acted upon by Messrs. Booth Brothers, Upper Stephen Street, Dublin, to whom the ownership of the design for No. 2 Clamp has been transferred, and very soon it may be obtained from them either in the form above described or otherwise improved or modified as their wide experience in such matters may suggest.

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f, *f*, which completes the two sides of the block ; *g* is the distance point.

I will now illustrate this by supposing we have a scene, as in Fig. 5, which shall represent a roadside inn, standing at the junction of two roads looking right and left, consequently drawn in oblique or angular perspective. It will be seen that the lines of the house and roads, fencing, etc., fall into the vanishing points, *a*, *a*. The point of sight, or distance point, is shown at A.

In drawing this picture, first settle on your horizontal line, *a a*, and vanishing points, which are shown at *a*, *a*, those dots being on the horizontal line, and also the distance point or point of sight, A. The base corner of the building is shown where your first perpendicular line, *e*, Fig. 4, rises, which would be to the right of the point of sight. Draw this first line, using your plumb-bob line for that purpose ; you may measure all other perpendicular lines from the first one, as it will be perfectly upright. The line *b b* is the base line.

Now dot the height of your doors and windows on your first perpendicular line, as at *b*, *b*, *b*, Fig. 4, by holding the line which you have hooked in at one or other of your vanishing points, *a*, *a*, on to the dots marked on your perpendicular line, drawing it tightly (see Fig. 6). In the other hand you have a piece of charcoal, and make a dot where your cord crosses the outer perpendicular line, *c*, Fig. 4. After you have completed all your dots, take the straight-edge, draw lines from dot to dot, and set the doors and windows out on these lines. The lines of the roads, water-trough, etc., are obtained in the same way.

By this time you will have become pretty well used to your two lines or cords—that is, you will have found out that you cannot draw a correct scene without them. The base line in Fig. 5 is 15 ft. along the front of house, and 5 ft. the other way.

I want you to well study the two rules I have shown and made as simple as possible—that is, "parallel," and "oblique or angular perspective," because every scene or study you may have to do must be done under one or other of these rules.

I wish you to bear in mind, however well a scene may be painted, one line wrong in the perspective would spoil the whole.

I had better here explain the meaning of the point of distance, which means the spot where the spectator is standing from the scene, looking straight before him, without turning the head to the right or left, depicting only what he sees while so doing.

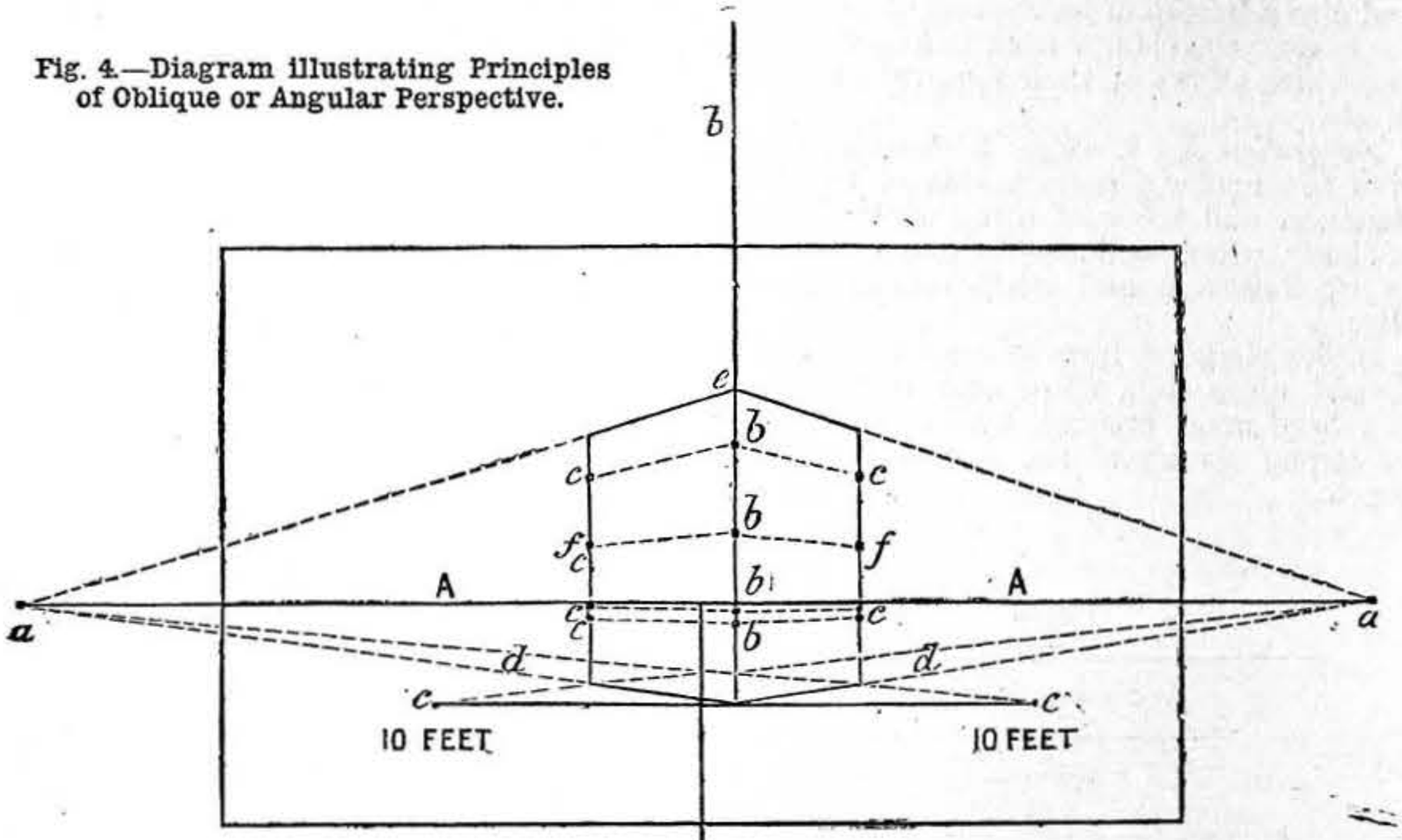
Supposing that you were to have a large hoop fixed in front of you, so that the eyes caught the edge of it, you are looking through this to the far distance—looking, as it were, through a funnel, by way of illustration—every object getting smaller and smaller as it recedes from the eye, all falling into one spot, which would be the small end of the funnel or dot, called the point of sight : this constitutes the rule of parallel perspective.

In angular perspective, as an illustration, if you place yourself opposite a square block set angularly, and look steadily at the corner near you, without moving the eyes, you will find you can only see a certain distance right and left—that is to say, you see the outer rim of a circle ; now, it is on the rim of this circle that the two measurements or vanishing points are fixed (see *a*, *a*, Fig. 5) ; A being the spot at which the spectator is supposed to stand.

The part of the circle you are looking through would be within an angle of 60°—that is, a section of the whole circle of 360°, that being six times 60° ; you would have to turn yourself six times before taking in the whole circle of 360°, comprising a panoramic or bird's-eye view ; I mean before you could sketch all the objects you would have to take six different turns, you being the centre of this panorama. The panorama which was called "Niagara in London" was a splendid illustration of this.

We have now come to the drawing of a few objects by the aid of these two rules, which are simple enough in themselves and easily understood. It requires a little practice to do the work with facility, but this may be obtained by working on a tolerably large scale on paper. It will render the work all the more easy when the beginner commences outlining and painting on the canvas itself.

Fig. 4.—Diagram illustrating Principles of Oblique or Angular Perspective.



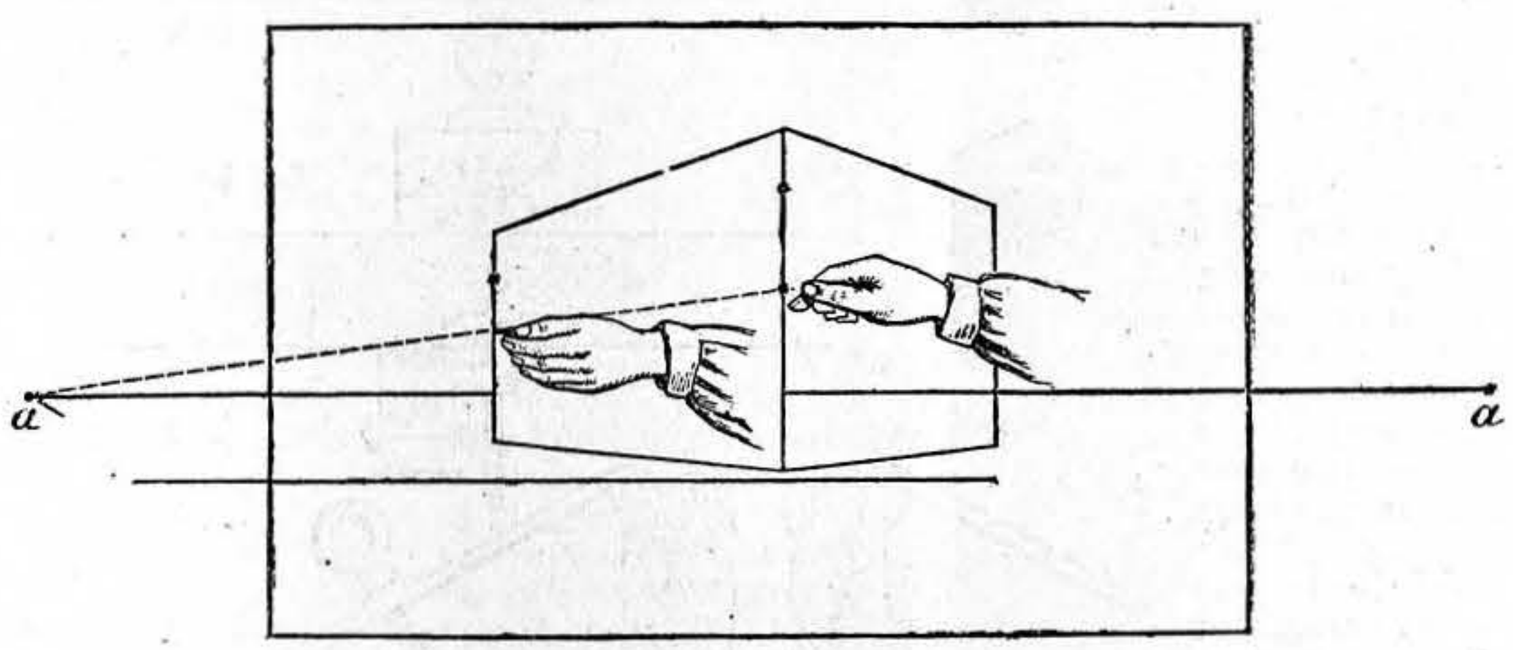


Fig. 6.—Mode of setting out Points on Cloth.

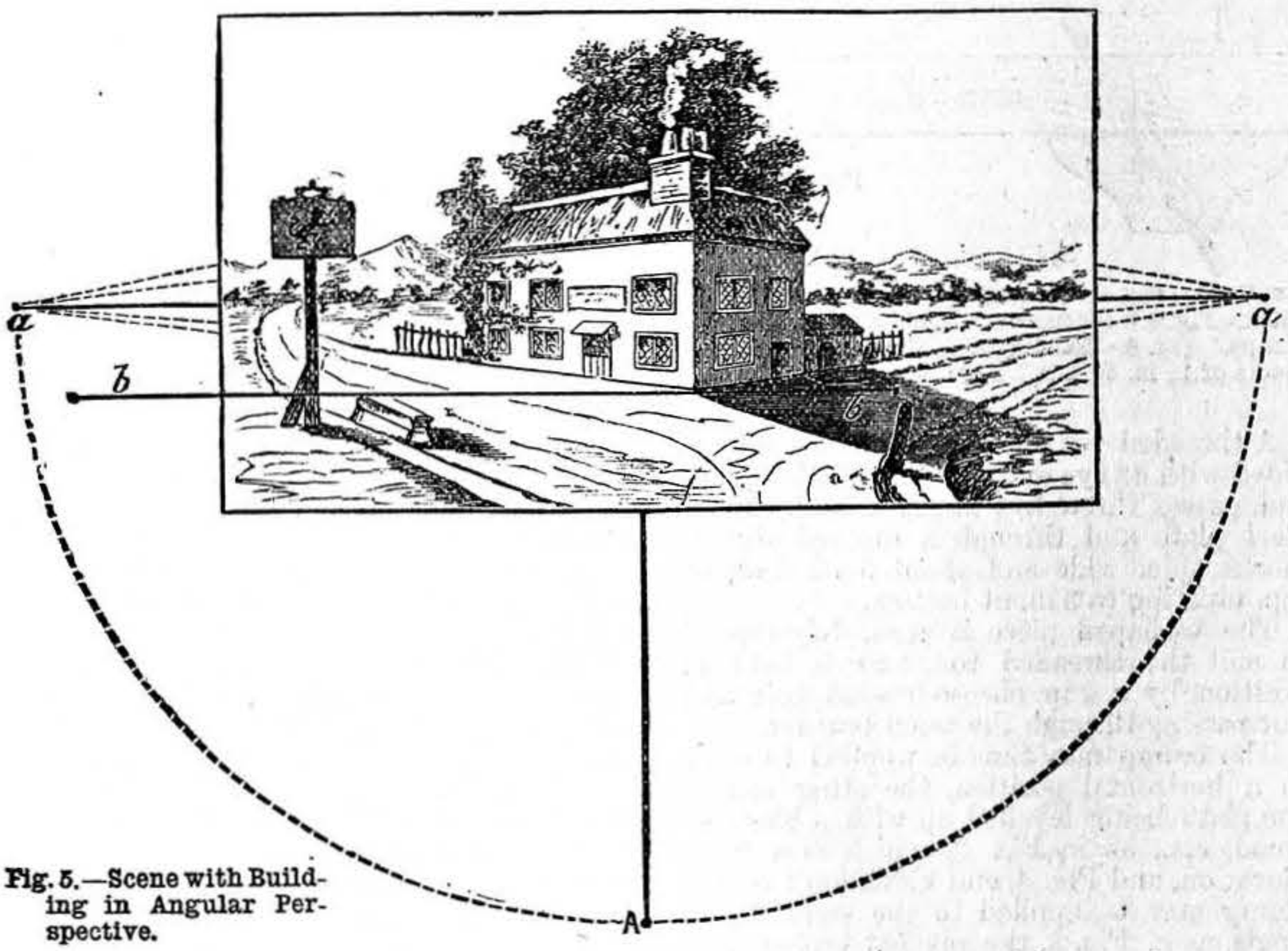


Fig. 5.—Scene with Building in Angular Perspective.

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SCRIBING-BLOCKS:
THEIR USES, AND HOW TO MAKE THEM.

BY J. H.

THE scribing-block or surface-gauge is indispensable to the fitter and turner, and extremely useful to the pattern-maker. Where compasses, compass callipers, scribers, and rules would be of no use for the marking of centre, and various other horizontal lines, the scribing-block is of service. No matter how irregular a face, or how many faces there are which bear no relation to any other faces, lines can be carried along them all with a scribing-block in a true plane, or in various planes parallel with one another. The marking-off table, or the surface-plate, supplies that true basis which is wanting in the piece of work itself, whether it be rough casting or forging. The scribing-point of the surface-gauge being clamped in any required position, and brought against the vertical face of the work, the broad base is slid over the marking-off table or surface-plate, and the point travels perfectly parallel therewith along the face of the work. Or the turned-down point tests the parallelism of an upper face of a piece of work true in itself, with the face of the table, preparatory to the marking off of some other portions of the same. Or heights and dimensions are transferred more directly and more accurately by means of the scribing-block than they can be by the compasses, particularly when the faces on which they are measured slope diagonally. Chucking centres are also marked upon work which has to be turned, the work being laid upon packing-blocks of V or other shape, and turned round into new positions, after the scribing of lines across the ends, the mean of all the lines, or their points of intersection, being the true centre for chucking.

These scribing-blocks are made in many modified forms, according to taste. The essentials are to have a broad, steady, and somewhat heavy base, and ease of movement of the scriber leg, and stability.

I show three forms of scribing-block, in which these conditions are fulfilled.

In the first form, illustrated in Figs. 1 and 2, there is a rod, A, of iron or steel turned to ½ in. or 7/16 in. diameter, and screwed into a base, B, of cast or of wrought iron. A divided block, C, slides upon this rod, and carries the scriber-point, D, which swivels to any angle, along with the tightening-screw, E, and washer, F. The sliding-block is shown enlarged at Fig. 2 for clearness. To make it, proceed thus:—

File a block of forged steel or wrought iron to the outline of the block, C, in Figs. 1 and 2. Drill a hole through it in one direction for the pillar, A, and another at right angles therewith—say, about 1 in. away from the centre of the first hole for the tightening-screw, E. Then, with a hack-saw, cut the slit carefully and parallel with the sides, so giving the elasticity required for pinching up the block.

The pin, E, will be turned down from a bit of rod, originally of the diameter of the head, and screwed about as far along as shown. A hole is drilled to take the scriber, D, which, it will be noted, is of circular section, and the precise position of the hole is of vital importance. Observe that it is drilled to come just a very trifle under the face of the washer, F, and the face of the washer is hollowed across to a corresponding depth to allow the scriber to lay against it, so that the washer and scriber turn together. When the screw-bolt is pulled hard with the milled head, G, the effect is therefore to pinch the scriber between the head and the washer.

The milled head is made of steel, iron, or brass. Turn and mill it first between centres, cut it off, and then drill and tap the hole for the screw. It is better, to ensure truth, to drive the milled head into a hard wood chuck, or hold it with the dogs and drill in the lathe than to drill in the vice.

Another and quite different type of scribing-block is shown in Figs. 3 and 4. It is a form which possesses the merit of great steadiness, but involves a little bit of pattern work and casting. There are three parts—the base, A, in cast iron or gun-metal, the scriber, B, the screw, G, and wing-nut, D.

The pattern of the base is like its casting, and the slot can be cast out by using a print and making a core-box—making it a little narrower than the screw to allow of cleaning out with a file. When cast, plane or file the three faces, *a*, *b*, *c*, at right angles with one another; and smooth over the other parts with the file, for the sake of good appearance.

The scriber, B, is made of steel, first roughed to outline on the anvil, then filed flat and parallel about the central portion, upon which the parallel lines forming the slot and the bounding metal will be marked and filed. The tapering ends may be turned for a portion of the distance out from the centre, but it is not necessary, as a little rough grinding, followed by filing, will bring them to a good shape.

The screw, C, is provided with a turned head and a square shoulder, to fit the slot, A. The wing-nut, D, is cut from iron, steel, or gun-metal—either will answer.

Another scribing-block is shown in Fig. 5. In this the stand is made of wrought iron entirely, the slotted portion being swaged down from a piece of 3 in. bar. The bottom is turned up to any good outline, and is hollowed at the bottom to rest only upon an annular ring of metal. The slotted part is then filed to thickness, equal sided from the chucking centre, and the slot and the outside edges lined out. Holes are drilled in contiguity for removing the bulk of the metal and the slot filed out.

Some trouble might be saved by making the slotted portion distinct from the base. The former would be of wrought iron, and the latter might be either wrought or cast. The scriber itself and the tightening-screw and wing-nut are like those shown in Figs. 3 and 4.

The dimensions given are not hard and fast. They are only given to assist in forming some idea of suitable proportions for blocks made either larger or smaller in size.

The height of a scribing-block is not of much importance, because when necessary for marking off work so high as to be beyond its range, it can be always raised up and slid along on a parallel block of iron placed upon the marking-off table. This is frequently necessary, and pieces of T-iron and channel iron of different depths, but planed truly parallel, are kept by the marker-off for this purpose, and also for blocking up work upon.

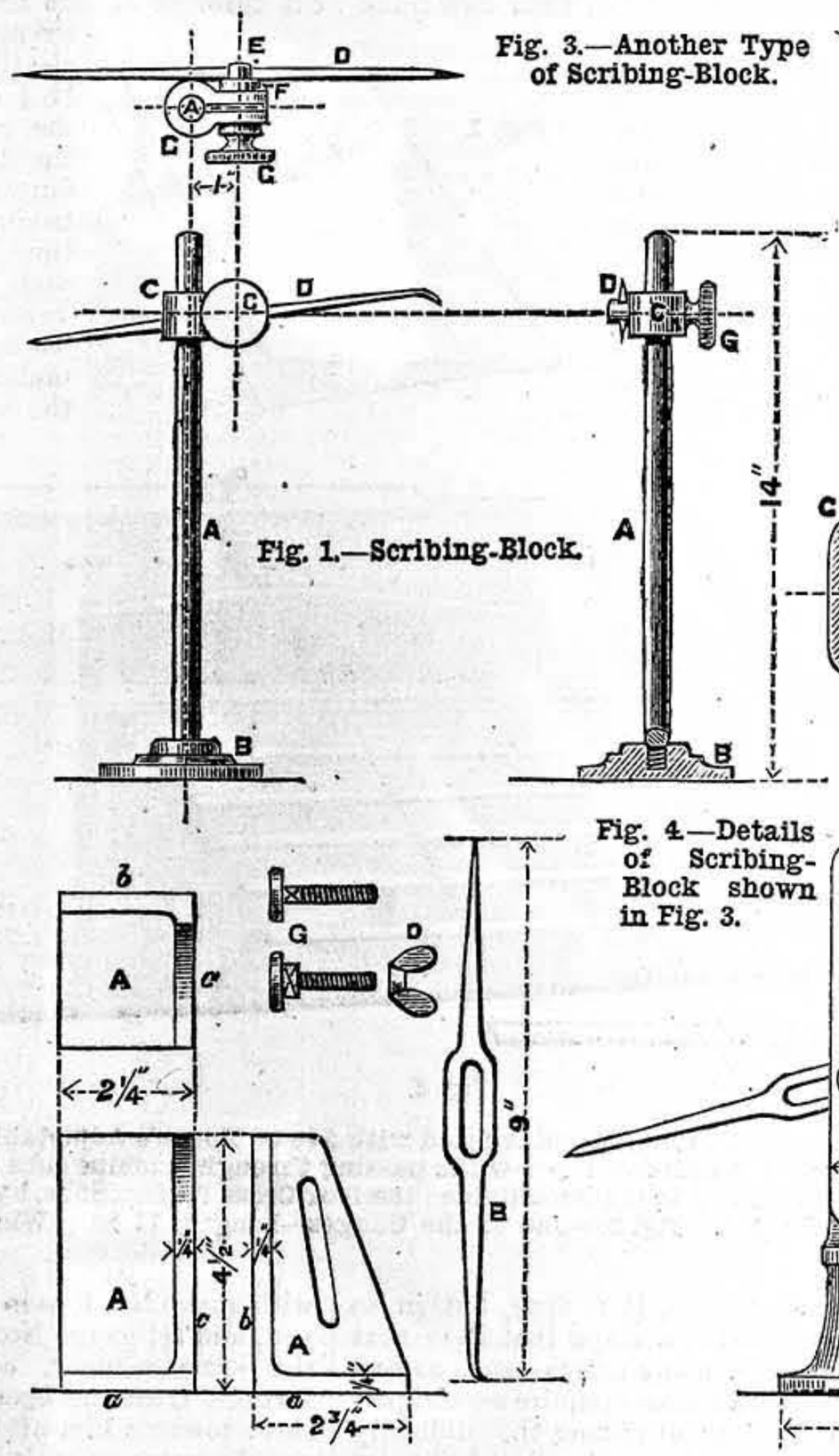
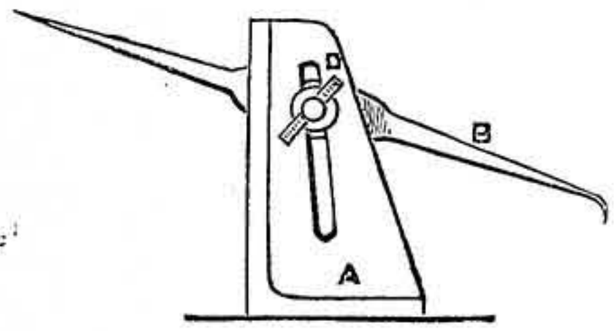


Fig. 1.—Scribing-Block.

Fig. 3.—Another Type of Scribing-Block.



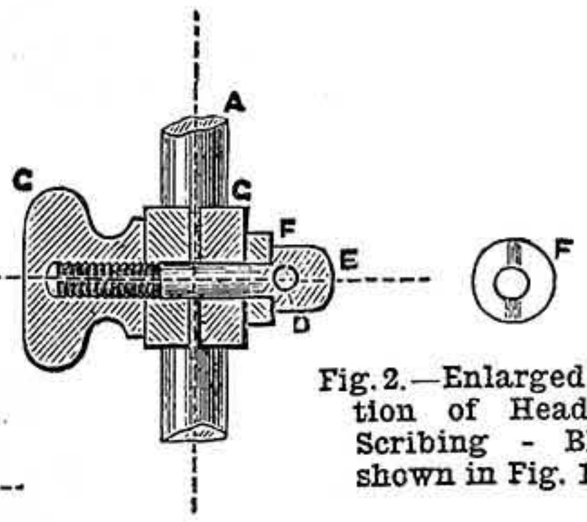


Fig. 2.—Enlarged Section of Head of Scribing-Block shown in Fig. 1.

Fig. 4.—Details of Scribing-Block shown in Fig. 3.

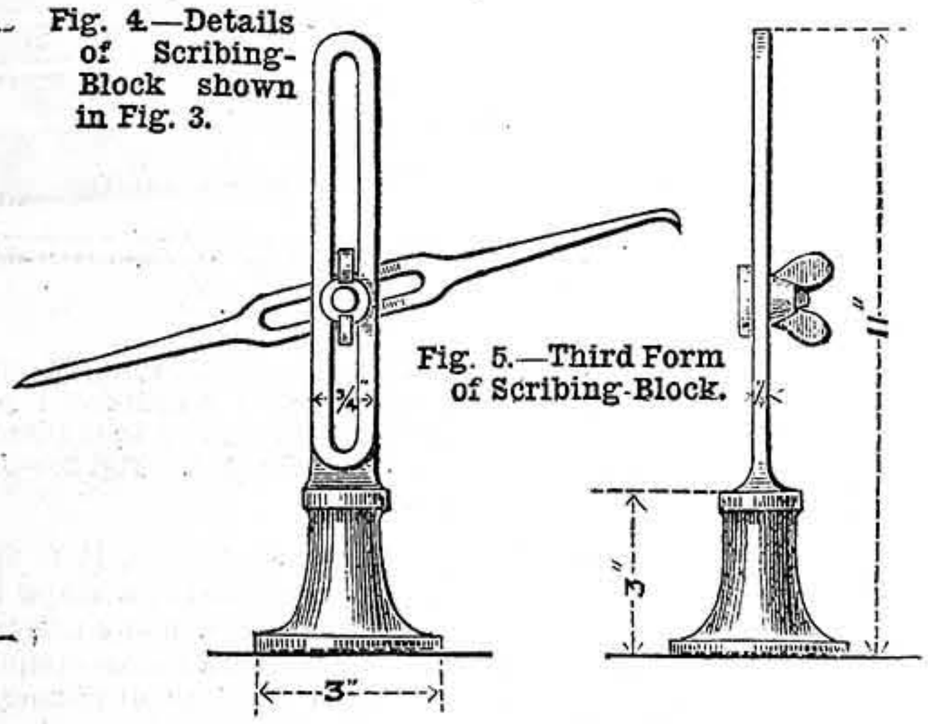


Fig. 5.—Third Form of Scribing-Block.

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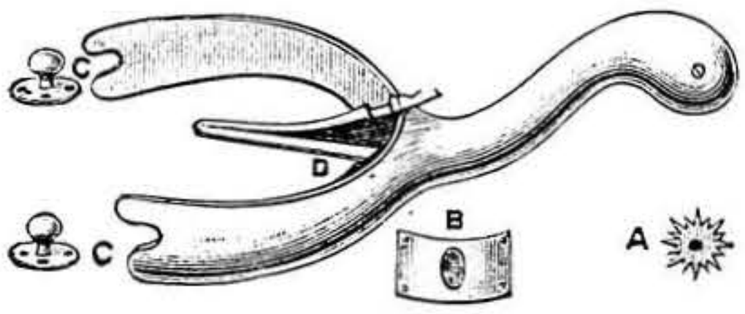
SPURS WITH CONCEALED ROWELS.

BY J. C. KING.

To those who have been visitors to English or foreign museums, anything new in the way of spurs will come as a surprise. So small a utility, and with such limited topical fixture, there seems but little chance of improvement. This little seems attained by a larger head—as the knob end is termed—and by having two holes in the rowel, a centre one for free turning, and an eccentric hole to make the rowel a fixture, concealed in the notch of the head of the spur, as shown in the illustration. A screw instead of a rivet is used, so that with the point of a knife, in absence of a bradawl, the screw can be removed and rowel placed just as wanted, in or out of sight.

The object to be gained is that spurs may be worn in company, where projecting rowels are apt to catch in dresses and cause snags and rents, more especially in ball-rooms. The inventor could not keep to his one idea of the rowel, but tried to simplify the fixing in the heel of the boot, now done by the pressure of a box-spring built into the boot-heel when the boots are made. It is a doubtful fixture at best. Spurs are often lost, or boxes get out of order. Their general faultiness prevents them from being adopted for the rank and file of cavalry corps, which mostly have a long screw passing right through the heel, screwing into the end of



Spur with Concealed Rowel—A, Rowel; B, Plate over Box to take Spring; C, C, Studs to receive ends of Spur; D, Spring.

one of the bows of the spur. This is a clumsy way, the projecting screw-point sometimes snagging the trousers in walking. The method of holding the spur into the boot-heel is by a shield-plate with an oval hole. To catch in a hole in the heel of a boot, a spring fixed to the tang of a spur, with a notch in it, catches into the shield-plate and holds it securely. To release it, the projecting end of the spring is pressed down at the same time as the spur is pulled out.

Additional support is given by two strap-studs fixed on the fore-parts of heel sides, and the bow-ends of the spurs have a fork notch to hold to these strap-studs. These studs, by the straps, keep the trousers down. For jack-boots, the jockey-spur is best, and is always used with them in the army or hunting field. Some people imagine the spur inflicts harm on a horse. It is not the actual prick that can ever do harm, but the impulse it gives to a horse, which the voice may equally do, to urge to over-exertion. No one should ride without spurs. They may save the rider's life from the flinching of a shying horse being diverted by the spur.

They, moreover, teach a novice to keep his feet pointing straight forward, to keep the rowels away from the sides of a high-mettled horse. The sorry hacks do not mind them; hence the uncouth riding of most of our mounted police, and not a few would be cavaliers in Rotten Row. The inventor is the author of a pamphlet on "Riding," and gives this spur to the readers of WORK if they think it worth adopting.

OUR GUIDE TO GOOD THINGS.

**** Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

66.—SLOANE'S ADJUSTABLE GAUGES FOR PERFORATING MACHINES.

THERE are, doubtless, many paper-rulers, bookbinders, and account-book makers among the professional readers of WORK, to whom the description of an adjunct to perforating machines, invented and supplied by one of their own trade—namely, Mr. Thomas C. C. Sloane, 59, South Castle Street, Liverpool—will prove interesting, if not useful. It appears, from what Mr. Sloane himself tells me, that the merit of the invention consists in putting into the hands of bookbinders, etc., a substitute, in a permanent, reliable, and ever-ready form, for some makeshift intended to achieve the same purpose, which is to be found in many workshops, it is true, but in so crude and untrustworthy a shape that it is next door to useless. Now many sheets—such as coal ticket and other check books—require several perforations on a sheet to overcome the difficulty of there being only one back "lay," and so users of perforating machines are driven to adopt various methods for securing "lays"—such as tacking or gluing strips of millboard on the front board, or making use of printers' quoins in the same manner, or even putting pins or pencil marks on the front board. It is clear that all such means are, to say the least of them, clumsy, calculated to waste the workman's time, never ready to hand when most wanted, and certainly unreliable. Mr. Sloane, however, claims that his gauges, on the contrary, are neat and handy, economisers of time, always ready for use, and such as may be always depended on. He says that when some look at the illustration of a perforating machine thus fitted, as shown in Fig. 1, they think that space is lost by having to come over some of the gauges; but this is not so, as the "lay" is set to suit the sheet, and all sheets that follow are bound to be the same. The nature of Mr. Sloane's appliance will be easily understood from Fig. 1, in which an ordinary perforating machine is shown fitted with five of the adjustable gauges, while Fig. 2 shows a sheet perforated once vertically from top to bottom and four times crosswise, the horizontal perforations being obtained by laying to four of the adjustable gauges. Fig. 3 shows one of the gauges by itself and off the machine. It also shows how they are secured—namely, by a short screw-bolt passing through the centre of the gauge, whose head is tightened on the gauge with a pressure sufficient to retain the gauge in position by a wing-nut which works on the screw. Yes, possibly some may say, "But how is the attachment to be managed? for there are no means whatever of attaching and securing the gauges to the perforating machines which I possess." The reply is, that it is necessary to modify the machine and render it fit to receive the gauges, and this is managed by cutting a slot parallel to the back lay right through the centre of the front board, leaving, as a matter of course, a portion of the board not cut through at the front and back edges for strength. This slot—which is clearly shown in Fig. 1—should be ⅜ in. in width. This done, the gauges must be placed on the board at the needful distances from each other, and having got them in due parallelism, put the bolt through each gauge and fasten from below with washer and nut. To set the lay, place the sheet under the teeth, and adjust the various lays, commencing with gauge No. 1, as in Fig. 1, draw sheet towards you, and set gauge No. 2, and so on. Prepare in the same manner, commencing with gauge furthest from the operator, who must draw the sheet towards him after each perforation. For use of gauges on back board, the slot of old back guide is made available, using large washer supplied to use with wing-nut. The gauges are made of wrought iron, and are supplied with fittings, washers, etc., complete, for 15s., or 15s. 6d. post free.

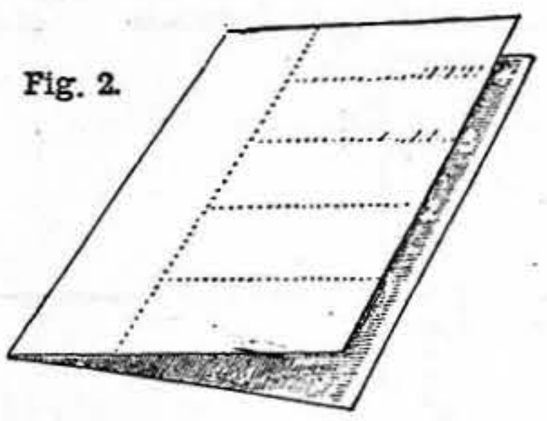


Fig. 2.

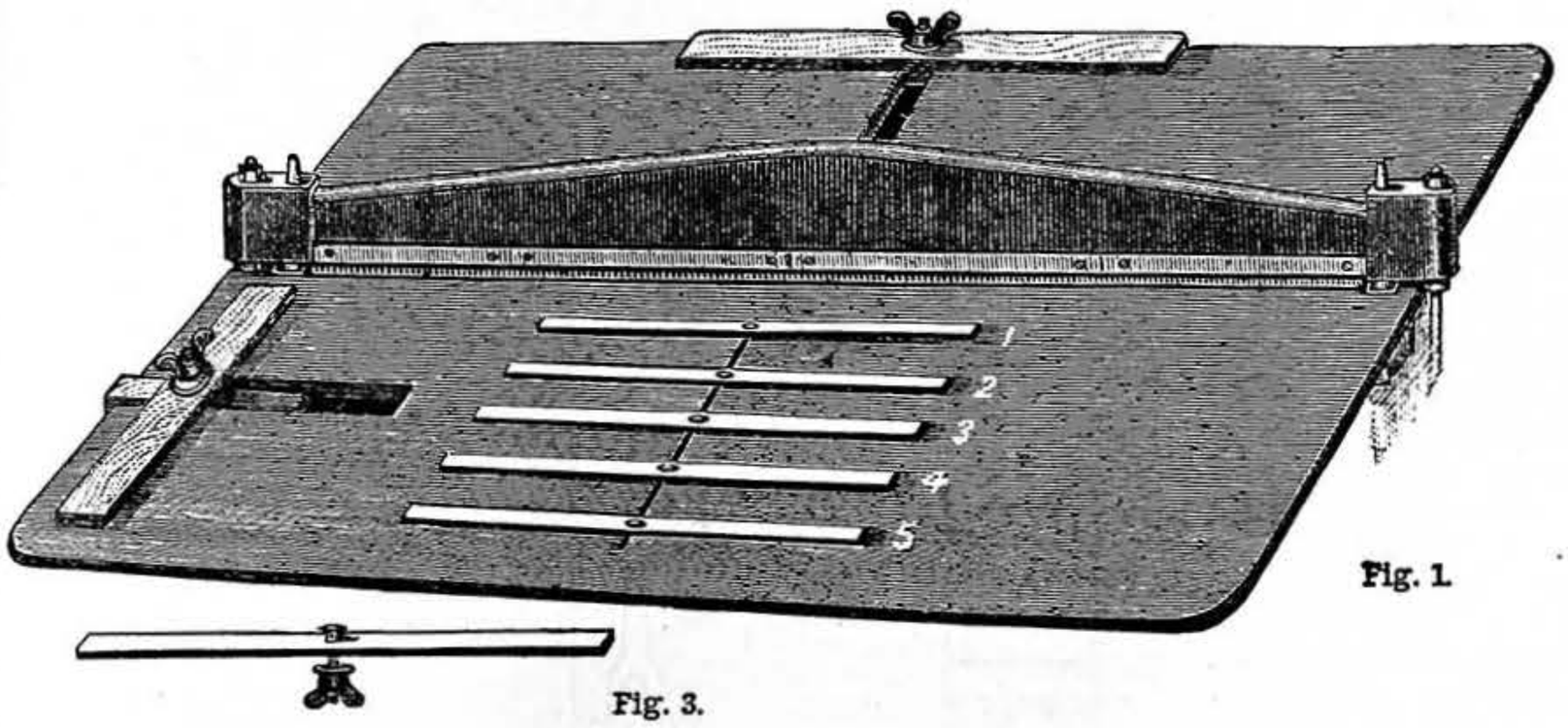


Fig. 1.

Fig. 3.

Fig. 1.—Ordinary Perforating Machine fitted with five of Sloane's Adjustable Gauges. Fig. 2.—Sheet perforated on one half five times while passing through Machine once; the Upright Perforation made by setting Lay to old Back Guide; the four Cross Perforations, by laying to four of Sloane's Adjustable Gauges. Fig. 3.—One of the Gauges—Length, 11 in.; Width, ¾ in.; Height, under $\frac{3}{10}$ in.

67.—COULTHARD'S DESIGNS FOR FRETWORK, ETC.

In an early number of WORK I spoke of these designs as being not only cheap but really and truly well suited for beginners, who are too often disheartened by commencing work on a difficult and intricate pattern. Mr. Coulthard, East Cliffe Terrace, Bournemouth, sends out a variety of designs in fretwork, stencilling, and turning at from 1s. to 2s. 6d. per packet. I believe I am justified in saying that any further information will be readily supplied by Mr. Coulthard to any applicant. Some have considered the designs somewhat rough in execution. Being from stencil plates some are unavoidably so, but the edges can always be set right with a camel-hair pencil and some Indian ink. THE EDITOR.

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SHOP:

A CORNER FOR THOSE WHO WANT TO TALK IT.

*** *In consequence of the great pressure upon the "Shop" columns of* WORK, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of WORK *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—LETTER FROM A CORRESPONDENT.

Boiled or Unboiled Oil?—A WEEKLY SUBSCRIBER writes:—"Having taken in WORK from the beginning, and derived pleasure and knowledge therefrom, I should feel greatly obliged to have the benefit of practical men's experience as to whether boiled or unboiled oil is the best for external use. In a week or two I purpose painting my house outside, and am anxious that it should have a varnishy appearance, but cannot ascertain the proper oil to use for that purpose. I have consulted four different house painters. Two of them say it must be boiled oil, and two exactly the contrary. Under these circumstances, I went to a shopkeeper who sold only paint to have his opinion, and he said oil that was not boiled must be used. After such conflicting opinions, I should much like WORK to decide the question, as I do not wish my house to have a dead, flat appearance a few weeks after it has been painted, but to look after two or three years as if it had been varnished. Perhaps, therefore, some of your practical correspondents will kindly inform me with certainty how the desired end can be accomplished. Also what good iron gutter for rain from the roof ought to cost per foot or yard."

II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

Field's Boiler.—E. S. (*Birmingham*).—I do not know the registration number of this boiler, but you can obtain all particulars regarding it from Messrs. Lewis, Olrick & Co., Leadenhall Street, London, E.C.—F. C.

Contributor's Address.—R. A. B. & Co. (*Kensington*).—We do not give the address of any contributor. Send a stamped, sealed, and addressed letter, and it shall be forwarded.

Paper for Stencil Plates.—STENCIL.—I am not aware of any paper specially made for this purpose; that in ordinary use is a stiff cartridge. To make it resist moisture from the colour and endure wear, some persons soak it in linseed oil, others go over it with "knotting." This latter is to be preferred. Knotting is used for going over knots in wood before painting, and may be bought at the colourman's. Another useful paper for stencil cutting is that known as "oiled foolscap." The original use of this is to lay between the sheets in the copying-press, and the larger stationers sell it. Its character is that of a thick tracing-paper. A drawn or printed design can be seen through and traced upon it, which is often a great advantage. It needs no further hardening.—S. W.

Mirror.—OLD FURNITURE.—To re-silver the parts of the mirror which have been scratched will be a difficult job, but if you wish to have a try, the silver process will be decidedly the best. You must make up two solutions, as follows: Dissolve 75 grains of nitrate of silver in 3½ ozs. of water; add dilute ammonia cautiously until the precipitate is nearly dissolved: there should be a small quantity undissolved at the bottom. Should too much ammonia have been poured in so as to take it all up, a drop or two of silver solution must be added, then shaken well and left to settle. Bottle and label A. Second solution: Dissolve 15 grains of nitrate of silver in 6 drams of water, and warm the solution. Next dissolve 12 grains of Rochelle salt in 3 drams of water, and when completely dissolved add to the silver. Stir well, and set to boil for about ten minutes; filter hot, and make up to 16 ozs. with distilled water. Bottle and label B. Form a wall of beeswax or putty round the spot to be silvered, mix half of A and half of B together, and pour on the glass. Let it stand about an hour, then wash carefully. One great difficulty will be to clean the glass, as it ought to be chemically clean for the silver to deposit properly. This is done by washing with potass water, acid, and alcohol, and washing with water between each operation, finishing off with distilled water.—W. E. D., JR.

Mosaic Work.—H. F. B. (*Barking*).—The pieces of glass for this, perhaps, you will be able to obtain of Messrs. J. Powell & Sons, Whitefriars Glass Works, Temple Street, London; or if not, they will, I think, be able to tell you where to get it. Write to them, *enclosing stamped envelope;* you can, if you like, refer to this answer.—W. E. D., JR.

Scrapers.—HODGE.—Yes, surfaces can be got up more accurately with a scraper than with the finest files; but as the files cut faster than the scraper, this last tool should not be resorted to till the surface-plate and straight-edge show the surface is nearly true. There are many kinds of scrapers. Take an old "three-square" file—a large saw-file will do—say 5 in. long; grind the point for about 1½ in. on each of the three sides till the teeth are quite gone and the ground surfaces are very slightly rounded. Now rub them on an oilstone till each of the three edges is quite smooth and nearly, but not quite, straight. Now you will find you can scrape cast iron, steel, and wrought iron surfaces, taking off the metal just where you want to. For brass, the three-square scraper is too greedy, as it has an angle of about 60°. For this metal take an old flat file—a 6 in. file would be suitable—about ¾ in. wide; grind the end of this off perfectly straight and square, then it will be perhaps ⅛ in. thick; this must be reduced to about $\frac{1}{32}$ in. by grinding the flat sides. Thus you will obtain two edges, which you must finish, as before, on an oilstone till they are perfectly smooth and very nearly straight, just slightly rounded when laid on a flat surface; the end surface must also go on the stone by rubbing it while in an upright position. On wrought iron the scraper will not cut very smoothly without a little water or oil. These two scrapers are quite sufficient for all the work on the ¼ horse-power engine. The gentleman who lives at "the Hall House" could give you much useful information.—F. A. M.

Finishing Turned Surfaces.—HODGE.—I don't know how to give a short answer to this. If you only want to do such work as is required in the ¼ horse-power engine, you can do very well without any scraping in the lathe except for brass. You can scrape brass with the flat scraper just described if you put the T-rest a little way off, say ½ in., and then apply the scraper, with the handle held high and the point of the tool pointing down below the centre of the work. This causes the edge to present in a proper way, and also gives some elasticity, which absorbs the vibration. In the slide-rest you would require a spring tool; but as I don't think you need one, I will not describe it here. If chattering occurs in brass, you can remove it by taking a light cut with a point tool, or with a file, used as the work is running in the lathe. For finishing small iron work when turned and filed smooth in the lathe, you can do well enough with two grades of emery-cloth; but if you want to polish a larger surface, such as the rim of a 16 in. fly-wheel, take a piece of deal about ¾ in. square and 1 ft. long, oil the end, and dip it into coarse emery powder; squeeze the powder into the wood, then put up the hand-rest and use the wood polisher like a tool, pressing it hard against the revolving surface. It takes some time to get a nice polish; the emery has to be constantly renewed, as it drops off the stick. It is hard work, and very dirty, and it will never do to let the emery powder get into your slides or mandril collar. Be very careful about this. You might as well have arsenic loose in the kitchen as have emery powder loose about a lathe. This stick is chiefly useful in curved hollows, into which it soon fits itself.—F. A. M.

Shafting.—HODGE.—Shafting can be turned on an ordinary slide-lathe, but it would be done at about half the cost on a special lathe made for the purpose. These have several tools working at once—for instance, there might be a *roughing* tool, adjusted to remove the bulk of the surplus metal, and then would follow, on another slide, fitted on the same saddle, a *finishing* tool, and then the travelling back-stay. The action of the finishing tool would, of course, be carefully watched with callipers, lest the edge should get damaged, and so the diameter of the work should increase. The turner would follow the finishing cut himself with a file and a ring gauge, filing till the ring gauge would pass. The ring gauge itself might be a trifle too large, and then the clamps would be used to grind the whole shaft to the exact size of a second and true ring gauge. Nothing like the same degree of accuracy can be attained by callipers.—F. A. M.

Hollow Rose Cutter for Making Pins.—HODGE.—I don't know of anything better than a rose cutter for making ⅛ in. pins from ¾ in. bars. If yours causes the work to jam, that must be because the mouth is too large. Probably it was drilled from that end, and where a drill enters is generally a little larger than the main part of the hole. This might have been prevented by turning away about ¼ in. at the end before cutting the teeth; *now* you might make a grinder to enlarge the hole a little, so as to leave it a little the smallest at the front end. A wooden grinder should do it. Turn a peg ⅛ in. in diameter, bore a hole up about ¼ in., then saw it down the middle. Now make a taper pin to drive into the ¼ in. hole, so as to expand it as it wears away. That should grind it out well enough.—F. A. M.

Incubator.—F. B. J. (*Liverpool*).—A description of a hot-air machine may appear in the course of a few months. A description of a canvas canoe appeared in No. 80, Vol. II.—LEGHORN.

Rearer.—NO NAME (*Maidenhead*).—Your wish may be gratified in the course of the next few months. An article on the subject is in hand.—LEGHORN.

Microscope.—(1) MICRO has a brass tube with a spring and a wooden thimble with lenses, and wants to know how to use it as a microscope. I am afraid I cannot assist MICRO. *Is* it a microscope? If so, what about object lens? Is it not rather a part of some kind of instrument or toy? If I could see it I could give better judgment. (2) "Should I need Canada balsam to make objects transparent?" Objects are rendered transparent, and the balsam is used as a transparent cement. (3) "Can I use the cheap camera lucida, recently described, to sketch with?" A camera lucida is used for that purpose, but I do not think you could use it with the instrument you described, as an instrument is needed that has a steady stand or clip for holding the object to be sketched, also focussing arrangement. If the instrument MICRO has is a microscope, or part of one, I judge it is nothing more than a simple instrument to use in the hand for examining objects such as flowers, etc.—O. B.

Bicycle.—E. G. says that he wishes to build a safety of the "Referee" pattern. The cut of machine shown in his letter is not a "Referee" pattern, but an "Impetus," by the St. George's Cycle Co. As I do not happen to have a "Referee" by me, I cannot give exact measurement of tubes, but the same lengths will make either frame. Accurate lengths cannot be given without a full-size drawing of the machine. Lengths to make the above frame or a "Referee" may be set down as follows, all the tubes being 18 B.W.G.: A, 19 in. × ⅞ in.; B, 16 in. × 1⅛ in.; C, 16 in. × 1¼ in.; D, 9 in × 1⅛ in.; E, F (two of each), 16 in. × ⅞ in.; tube inside steering barrel, 11 in. ×1 in. With regard to brazing, ample instructions are given in WORK ("Safety Bicycle Construction"). The bottom bracket is brazed to the tubes with the end cups left out. These are afterwards sweated in with soft or tinman's solder. If the bracket has no cups, but simply the ends hollowed out for the balls, they, of course, get softened by heat in brazing, and must be hardened by tempering afterwards, when the hollow for the balls is very likely to get out of truth in the process, and the same with the ball-head. To harden, heat each end separately to dull red, and plunge in water.—A. S. P.

Dark Slide.—NEWCASTLE-ON-TYNE.—Slides for detective cameras are not particularly difficult to make. The protection afforded by the camera permits less accurate workmanship than in other kinds of slides. Very serviceable ones can be made of blackened cardboard and ferrotype plate. Procure some stout, hard cardboard, and cut out some pieces—as many as the number of slides you propose making—half an inch larger in length and

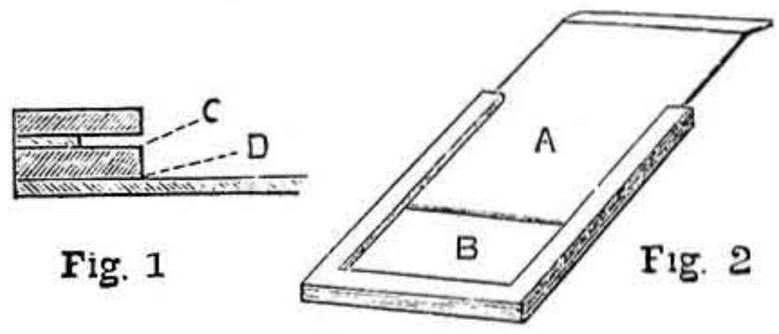

Fig. 1 Fig. 2

Fig. 1.—Section of Home-made Dark Slide for Camera—C, Groove; D, Recess. Fig. 2.—Slide Complete—A, Shutter; B, Recess for Plate.

breadth than the plates to be worked. Cut some slips of cardboard a little thicker than the glass of the dry plate, and a quarter of an inch wide, and glue them on to the edges of one side of the card to form a shallow cell to receive the sensitised plate. On these slips fasten other slips made of thinner cardboard on three sides, one-eighth of an inch wide, and on these again other slips a quarter of an inch wide, which will thus leave a groove for the shutter, which is to be made of a ferrotype plate bent at one end to form a cap to the slide, and act as a protection from the light. A coating of lamp-black in gold size, made to the consistency of paint, will complete the matter. The accompanying diagrams will show a section of the frame (Fig. 1) and (Fig. 2) the slide complete.—D.

Transferring.—R. W. D. (*Ardwick*).—In the first instance it is necessary to make a negative of the picture to be transferred in the usual manner, for, whatever process is afterwards adopted, much depends on the purpose for which the impression on wood is required (whether for blocks for printing or merely decorative purposes), or to the most suitable process. A slight sketch of how to do it is, firstly, to prepare the wood with a coating of chloride of ammonium in a weak solution of gelatine; drying; then sensitising by brushing over it a strong solution of silver nitrate, in a room lighted with a yellow light, and drying in the dark. The negative is then placed in close contact with the dry surface, and exposed to the light sufficiently long to print the image, which is afterwards washed and fixed in hyposulphite of soda solution, washed again, and dried. Or carbon tissue can be used, and the image transferred from the tissue to the wood direct, in the usual manner of carbon printing. Either process requires a certain amount of knowledge of photographic manipulation to be successfully conducted.—D.

Simple Camera.—CAMERA will find a working drawing of a camera in No. 13 of WORK. The size and principles involved are pretty well the same in all cameras, the difference being in the workmanship and finish bestowed. In reality, a camera is neither more nor less than a collapsible box with a lens at one end and an arrangement for holding the plates at the other, so that the lens and plate may be approached or separated from each other at will. Why not get one of the numerous handbooks on photography already published? Your suggestion shall be considered.—D.

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Carpenters' Bench Maker.—J. O. H. (*Wandsworth Common*).—The address of a man who makes all classes of benches, and whose business is an old-established one, is: Mr. Hollis, 286, Old Street, Shoreditch, E.C.—J. S.

Telescope.—G. C. B. (*Echuca, Victoria*).—Mr. Clarkson, 28, Bartlett's Buildings, Holborn Viaduct, London, deals in second-hand telescopes. It does not appear that he publishes a catalogue of instruments on hand, as these must, of necessity, be continually varying in character and quantity; but I cull the following particulars from a memorandum sent me in reply to a letter addressed to him on your behalf. From this I find he has a 6 in. object glass by Wray, partly mounted, can be completed for £50; a 4 in. on hand at £20; also has knowledge of a 5 in., owned by a gentleman, who wants £55 for it. These are refractors. In reflecting telescopes, he has an 8½ in. equatorial at £20, which cost £60 from Mr. Calver, and a 12½ in. reflecting equatorial at £55, priced in Browning's catalogue at £248. Eye-pieces or powers are 15s. each. Of course, any or all of these are liable to be sold ere this meets your eye; but the above will serve, in some measure, to indicate the probable outlay necessary for the purchase of an instrument such as you require. Meanwhile, I would suggest that in future communications full particulars should be given as to mounting, powers required, etc., also (seeing that you only give aperture and focus) whether a refractor or reflector is intended, as you will observe there is a very substantial difference in price between the two types.—T. R.

Arc Lamp for Alternating Current.—W. T. (*London, N.*).—The makers of the Brockie Pell, the Crompton, and the Brush arc lamps adapt their lamps to suit alternating currents. Either or all of these are good lamps. If you wish to know anything respecting the behaviour of these lamps, write to Messrs. Crompton, Chelmsford, Essex, on matters relating to the Crompton lamp, or to Messrs. Woodhouse & Rawson, United, Limited, 88, Queen Victoria Street, London, E.C., who are agents for the sale of a large variety of lamps.—G. E. B.

Price of Covered Wires.—J. B. (*Bradford*).—Nos. 18 and 20 d.-c.-c. copper wire command a price varying from 2s. 4d. to 2s. 9d. per lb. It can be obtained from any dealer in dynamos and electrical goods. Wire-makers do not care to supply small quantities of wire to amateurs at any price, and dealers must be paid for their trouble in getting the wire from the makers.—G. E. B.

Electro-plating.—J. G. (*Liverpool*).—A short series of articles on "Electro-gilding and Electro-plating" such small articles as those which fall to the lot of watchmakers and jewellers to deal with, were published in WORK of April 4th and 25th and May 5th, 1891. The "Electro-platers' Handbook," price 3s., has been highly commended by practical men, who say it is the best book for amateurs and beginners in the art of electro-plating. It is published by Messrs. Whittaker & Co., 2, White Hart Street, Paternoster Square, London, E.C.—G. E. B.

Brass Ferrules for Fishing-rods.—W. S. (*Pontefract*).—Messrs. T. C. Hughes & Son, fishing-tackle manufacturers, Redditch, will supply these *wholesale*. Your better plan will be to order them through some local dealer in fishing-tackle.—S. W.

Wood-pulp Paper.—H. D. (*West Norwood*).—Messrs. J. Spicer & Son, importers of foreign papers, 120, Edmund Street, Birmingham, might be applied to. They have a reputation for supplying these foreign papers on lower terms than the London houses.—S. W.

Harvest Festival Decorations.—A SUBSCRIBER.—In decorating for a harvest festival, the idea is a grateful acknowledgment of the Divine blessing on the labours of man. The fitness of things, therefore, seems to demand that the first and most important place should be given to such of the food products of the earth as can be used with decorative effect, and that next to these should come cultivated flowers, also a result of man's industry under the Divine blessing; but that wild flowers, the spontaneous gift of nature, should only be used sparingly, as being less appropriate to the occasion. This would be my view of the case, but the subject is not one on which to be dogmatic. A SUBSCRIBER should read the articles on "Temporary Decorations for the Interiors of Buildings" in WORK, Vol. II., pp. 510 and 552, in which harvest decoration has been dealt with.—A. Y.

Paper Wheels.—W. H. K. (*No Address*).—The so-called paper wheels are of iron for tire, flange, and hub. The intervening space between hub and tire is so formed as to retain a composition similar in some of its constituents to paper, but not actually paper as we generally regard it, being a composition of tough, fibrous pulp, said to be forty-four parts of pulp, to which is mixed one part of starch, one of gum, one of bichromate of potash, and three of benzine. Linseed oil and glue also form part of the composition, which is forced into the wheel between the hub and tire by hydraulic power, and the pressure kept on till the material is set. This composition has been found to yield at the hub, and allow it to get loose before the wheel is worn down, so that the composition must be renewed or the wheel cast aside as useless. It is found to be essential that some form of radiating spoke attachment to the hub is necessary to ensure long life to such a wheel, which, after all, has the composition in the most non-essential part of it. Wood is used to fill in the space sometimes, but that does not constitute it a wooden wheel.—J. C. K.

Distance Register.—KILOMÉTRIQUE.—The municipality of Paris, which determines the traffic management of Paris streets, and the regulation of hired vehicles traversing the city, are now trying

Fig. 1.

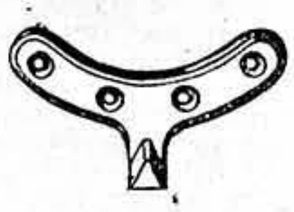

Fig. 2.

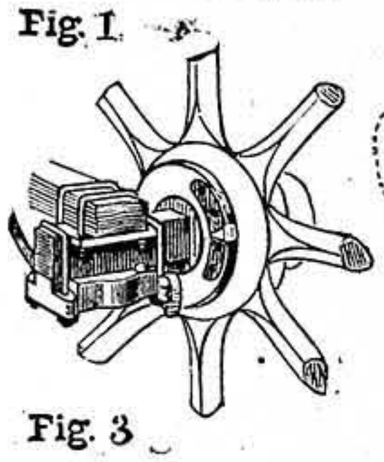

Fig. 3.

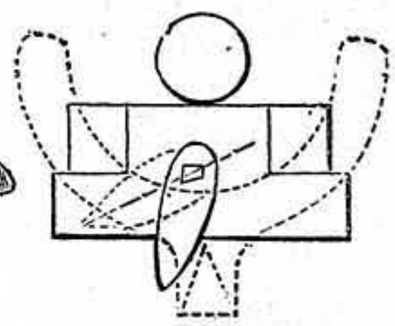

Fig. 4.

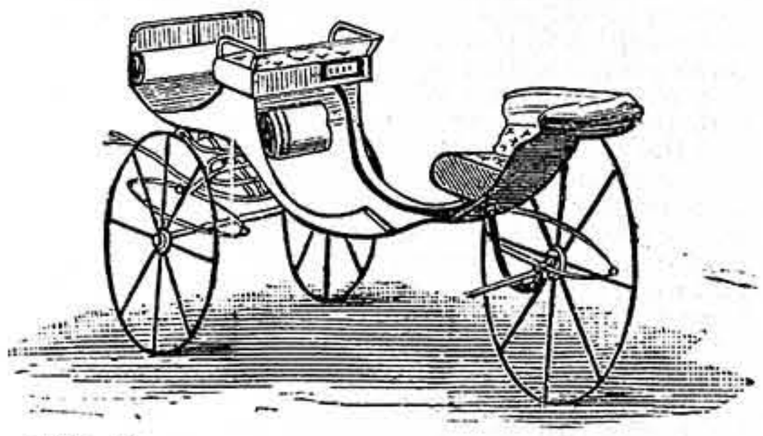

Fig. 5.

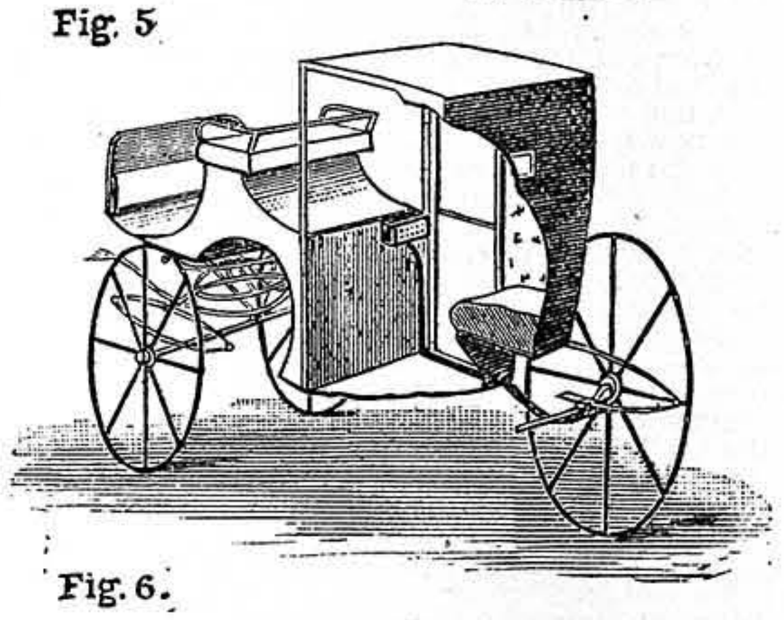

Fig. 6.

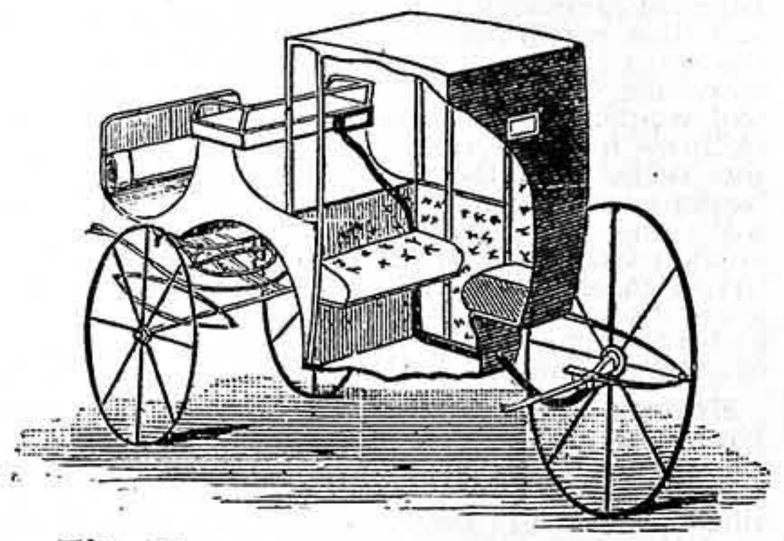

Fig. 7.

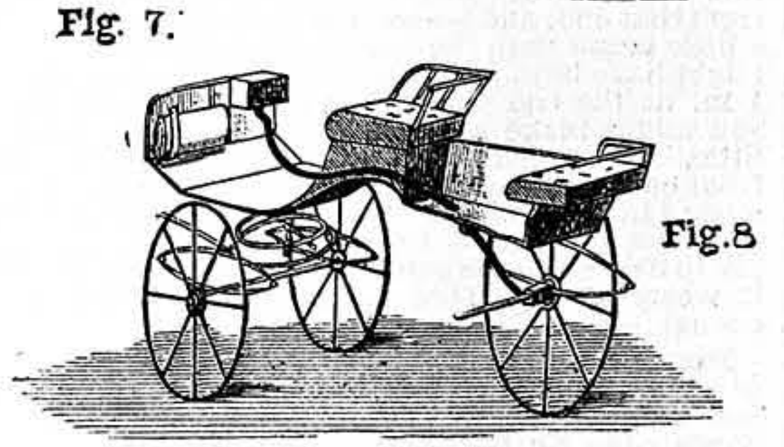

Fig. 8.

Fig. 1.—Register of "Compteur Kilométrique." Fig. 2.—Wedge on Nave. Fig. 3.—Mode of applying Wedge. Figs. 4, 5, 6, 7, and 8.—Sketches showing Modes of fitting Register on Vehicles of different kinds and forms.

several competing systems of "distance registers," and at the beginning of the new year will report on them, and if one is more efficacious than others, will probably authorise its adoption by the Paris cab companies, so that the law of compulsion to use them is irrevocable till the municipality chooses to rescind or alter it. Amongst several registers now on trial, or are patented with the view to ulterior adoption, some indicate fare to be paid, as well as distance travelled; some the time occupied on a journey, and for parcels, register the weight carried, etc. Amongst the many is a distance register known as "Compteur Kilométrique," by Boiquand et Fils, 127, Rue Oberkampf, Paris. It is simple in form, and follows nearly, in its constructive application, most wheel-operating mechanism for the same object. The register is contained in a small box, about 4 in. by 4 in. by 5 in., with the statement of distance on the front, as shown by diagram, Fig. 1. Its action is pneumatic in its motor of transmission. This is fixed on the inside front rail of a single brougham, just under the rail of the glass-rest known as the "belt-rail" in the trade. (Fig. 6.) For an open vehicle it is fixed at the back of the coachman's seat; for a double brougham the same position is best, being out of the way of the backs of the front-seat riders; also for Victorias. For a phæton the dash-iron is used to attach the register to, as is shown severally by Figs. 7, 5, and 8. The plan of attachments, of course, varies with the vehicle, but the main device is by screwed clips, holding a box of transmission under the axle (as in Fig. 3), close to the back of the nave of one of the hind wheels of a four-wheeled vehicle, as shown by Fig. 4. A wedge (Fig. 2) is fixed on the back face of the nave, just inside the nave-hoop, as shown in Fig. 3. A pawl is struck by this wedge once in every revolution of the wheel: this acts in compressing the air in an indiarubber tube, which communicates its impulse to letters on the dial of a register forming the index. This tube is protected by a casing of copper pipe, carried from the axle inside the body under the lining up to the register.—J. C. K.

Covers for WORK.—J. H. (*Wolverhampton*).—The pasteboard covers were suggested as temporary means to keep the numbers clean until binding time comes. Your wish is that the advertisements could be relegated to covers, on the plea that as the numbers are now constituted the advertisement pages must of necessity be bound up with them. Otherwise, if they were cut away the front page of each number would be set adrift. There are more ways than one of killing pussy, and I have always found that if I am dead set on carrying out any laudable desire I can generally manage it in one way if not in another. You can cut away the 15th and 16th pages, leaving a narrow strip of paper to paste along the inner edge of page 14. This will secure the front page, and accomplish your purpose. Or you might annex a leaf, which would give you two blank pages for memoranda. Never mind the gaps in the pagination; there will be no reference to them in the index.

Camera Obscura.—BRIGHTON BIRD asks for the most simple way to construct a camera obscura 10 in. by 20 in.; also the way to make small paper balloons, material used, etc. If BRIGHTON BIRD has, or could procure, the fourth volume of *Cassell's Popular Educator* he would there find the subject treated more fully than can be done in "Shop." With reference to the camera, I presume it is 10 in. wide and 20 in. long. In one end a central hole must be cut to receive a focussing tube carrying a lens, which must have a focus a little more than the combined length and depth of the box. At the opposite end to the one carrying the lens, one-half of the top must be removed and replaced by ground glass, the rough side outside. A mirror is fixed in the box, slanting from the back at an angle of 45°. The light passes through the lens, and pictures the object on the mirror, which reflects it up to the ground glass. Under ordinary circumstances, the diffused light in the room would render the picture very faint; to prevent this, a hinged flap with side pieces is placed in front of the ground glass on the outside, which puts the picture in the shade, and thus allows the details to appear. The essentials are a lens with adjustable tube, mirror placed at an angle of 45°, and a ground glass plate to receive the picture; all else must be a matter of taste or cost. It may be said that there are many modifications of the instrument, but the one given is the simplest. *Balloons.*—I have made these toys, but not for many years. The material I employed, and what is generally used, was coloured tissue-paper. Decide the size of the balloon, and cut the gores accordingly. I fastened the pieces with gum. The making is a very simple affair, requiring more patience and gentle handling than anything else.—O. B.

Re-charging Accumulators.—W. J. D. (*Manchester*).—The plates which show white or milky patches have been discharged too much. The set of cells must never be discharged below a mean pressure of 2 volts per cell. If you fully discharge any of the cells, the plates will be ruined by the formation of lead sulphate. Test them when you think the charge is nearly run down, and re-charge any cell giving a less pressure than 1·9 volts. Sir David Salomons, in his book on the "Management of Accumulators," says:—"There must always remain about 25 per cent. of the total charge the cell is capable of taking, otherwise troubles arise." Did you re-charge the battery before you emptied the cells of acid? If not, you should have done so. You should also keep the cells charged when standing idle, by sending currents through them every day or two. The colour of the plates should be the same after re-charging as after the first charging. Your remedy now is to overcharge them with a reduced volume of current some few hours more than usual.—G. E. B.

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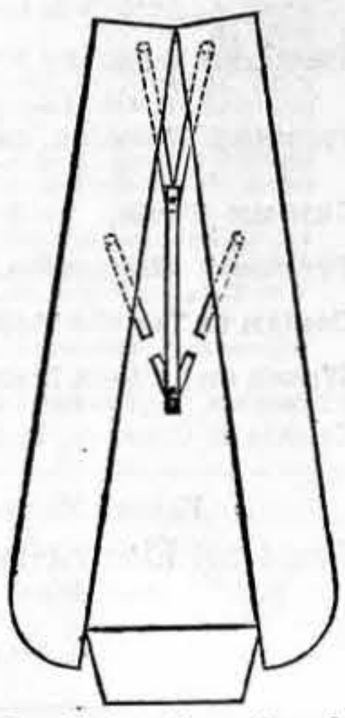
Parallel-acting Bench Vice.—S. AFRICA.—The vice referred to is one that is in use, though but little known, and has acted properly with heavy work of carriage making, so that yours should do the same. I will help you to a comprehension of your difficulty, and explain the principle which determines the parallelism of the jaws under screw pressure with anything held tight at the upper parts. The diagram (Fig. 1) shows the jaws with a block of wood in, and the screw applied, with such excess strain put on it that the top parallel irons are rent apart. This would be the result if the joint-pins in the vice did not yield from their fixings. It is possible your joints spring, or are too loose, or the lower diagonal irons are a little short. To remedy any of these defects, have them a little longer than the upper ones, but they must be only so to a trifling degree, which will be compensated for by the slight free-play of the joints and fixings.—J. C. K.



Parallel-acting Bench Vice.

Oil for Gas Engine.—W. J. A. (*St. Helens*).—We use an oil specially made for Messrs. Crossley, the makers of the Otto gas engine. This is all that could be desired. Vegetable oils of a low flash point clog the piston and cylinder with carbon. Castor oil is unsuitable.—G. E. B.

Heating of Dynamo Machine.—W. J. A. (*St. Helens*).—If a shunt- or a compound-wound machine is run without a load—that is, unconnected to any work in the outer circuit—all the current generated in the armature coil is sent through the shunt coils on the field-magnet cores, and there is a consequent heating of the brushes, as evidenced by sparks from them where they touch the commutator. If the brushes are taken off from any machine, whether shunt, series, or compound wound, there will be no current passing through the coils, nor any heating of the machine from this cause. If your friends have observed a rise of temperature when the brushes have been taken off, this rise must be due to increased friction of the spindle on the bearings, consequent upon increased speed of the spindle. I cannot think of any other cause, and this would be insignificant in a well-made machine.—G. E. B.

Engine without Valve or Eccentric.—BONZO.—Oh, BONZO! how could you write to us on such a piece of paper! It surely comes out of the dust-bin. Yes; you can make a little oscillating engine, like those in the toy-shops, without either valve or eccentric. You will see a drawing of the parts, etc., of this in WORK for November 30, 1889, p. 589, Vol. I.—F. A. M.

Monogram for Fretwork.—T. W. C. (*Wolverhampton*).—I have drawn the T and C in outline to show that they are practically the same as the T

Monogram for Fretwork—T.W.C.

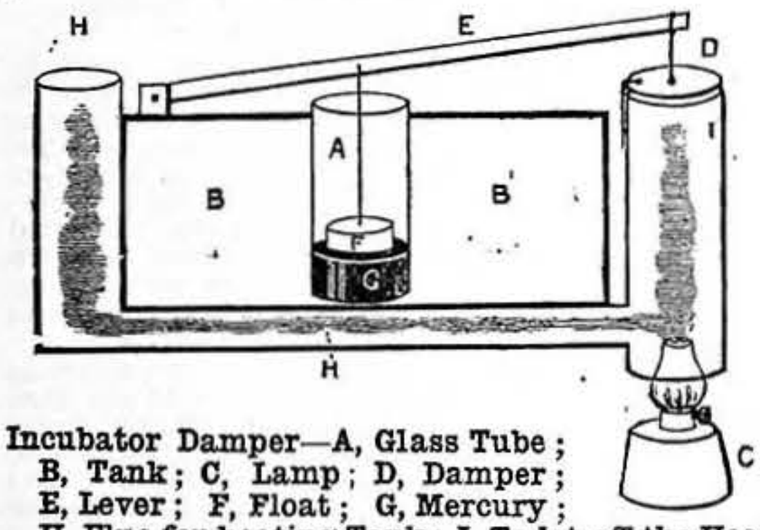
and G of the monogram T.M.G, appearing in No. 104, p. 813, and by sloping the sides and slightly rearranging the centre of the M, produced the W. If T. W. C.'s eye is sufficiently trained, and he possesses intelligence and patience enough to pierce an elaborate portrait frame, I should have thought him capable of making these trifling alterations himself.—A. C.

Voltage of Dynamo.—W. J. D. (*Manchester*).—Your dynamo is evidently a compound-wound machine. Consequently, when you are taking the full current of 35 ampères from the machine, this volume of current is passing through the field-magnet coils, and strongly magnetising the fields. If the normal speed of 920 revolutions per minute is maintained at this time, the voltage of the current will also rise, because the armature coils revolve in a more intense magnetic field and cut stronger lines of magnetic force than when the field-magnets were less strongly magnetised. I am not well acquainted with the machine named by you, so can only surmise the pins you mention to belong to a set of resistances restricting the output of the machine.—G. E. B.

Candle-making and Tallow-refining.—W. G. (*Bradford*).—I am unable to point out any book on this subject, but there are interesting and useful articles upon it in "Cassell's Household Guide," Vol. III., pp. 143 and 161.—M. M.

Honey Extractor.—S. L. (*Haslemere*).—If you procure Nos. 77 and 81 of WORK, you will find, at pp. 395 and 465, descriptions of the "Little Wonder" and "Cylinder" extractors. If you take up bee-keeping, I would strongly advise you to get Vol. II. of WORK, and read the papers on "Hives and other Apiarian Appliances" running through it. I shall be most happy to help you in any way.—APIS.

Incubator Damper.—R. T. (*Sunderland*).—The gas regulator does not work a damper, but the expansion of the mercury cuts off the supply of gas. Before R. T. will see this, he will have seen a section of Hearson's patent incubator, which does depend on the action of a damper for its efficiency, the temperature, when it rises above the desired point, causing the current of hot air from the lamp to pass straight away and not heat the tank of water. Any chemistry book will tell the boiling points of various fluids, but the special fluid used



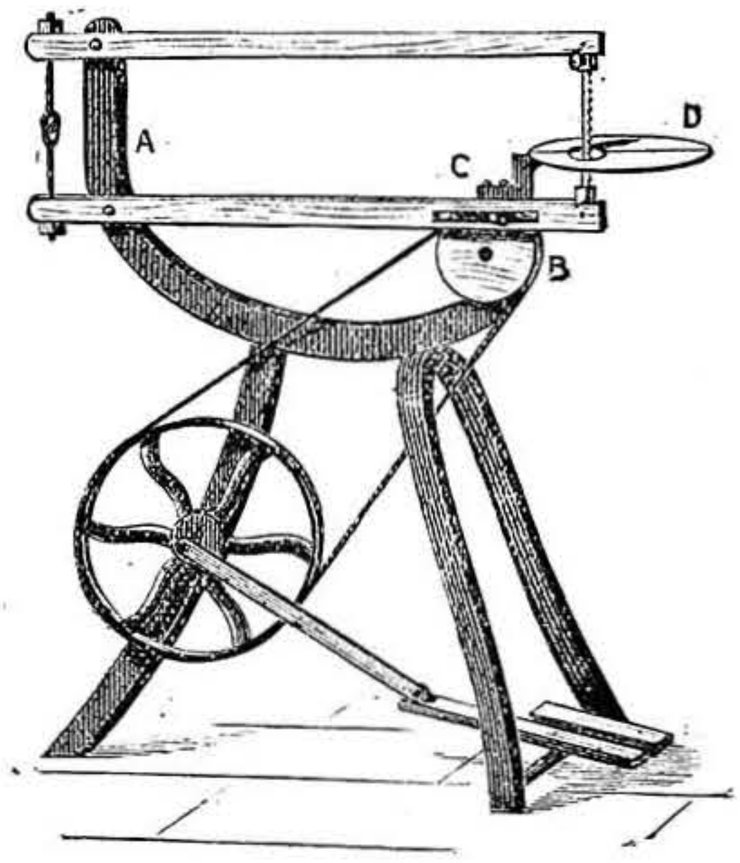
Incubator Damper—A, Glass Tube; B, Tank; C, Lamp; D, Damper; E, Lever; F, Float; G, Mercury; H, Flue for heating Tank; I, To let off the Heat when Damper rises, which it does when Mercury expands.

by Mr. Hearson is his discovery, and the vital part of his patent. R. T. can no doubt find other fluids to answer the same purpose, but I am not sure whether he may copy the invention of Mr. Hearson so closely. I think benzoline would come nearest the required temperature, but mercury might be used, according to enclosed sketch. Though I am always glad to help the readers of WORK, this is not a precedent to show that I can invent a scheme to assist everyone who is in a difficulty. It is not always possible.—B. A. B.

Dark Slide.—R. I. L. C. (*London, E.C.*).—The simplest plan is to get some good hard eight-sheet cardboard; cut a piece the same size as the focussing frame, glue some strips on to the face of it round the edges, so that a cell is formed in which the sensitive plate can be placed. On these strips glue others half the width, and again on these some wider ones, so that a groove is formed in which a piece of cardboard, to act as a shutter, can slide up and down. Cover the shutter with cotton velvet, and let it project ½ in. beyond the top of the rest part, so that it can be pulled out for exposure. The whole should be painted over with Bates' black varnish. In this manner a useful dark slide may be extemporised. Care, of course, must be taken to have the dimensions accurate to suit the camera, and so that the plate will occupy the same position as the ground glass of the focussing screen. Also the fitting of the cardboard must be good, so that all stray light is prevented from access to the plate.—D.

Camera.—QUÆSITOR.—(1) The camera and lens mentioned is a serviceable article, and very good work can be done with it. (2) Single portraits can be taken with these lenses; the drawback is that the exposure is somewhat long. The rapid rectilinear lens is better in two respects—absolutely straight lines are given, and the aperture of the slot is much larger, of course, working so much more rapidly. (3) Yes. (4) The price mentioned is low; consequently lenses by the best makers are not available, as they would exceed this figure. Only trying a lens will ensure that it is suitable for what you want, as the cheaper lenses vary very much in quality; very good ones may be had. Why not try Morley, Islington Green, or Sands and Hunter, Cranbourne Street, for a second-hand one? (5) Yes; but a short focus lens is most suitable for enlargement. A long focus lens requires a long distance between the lens and the focussing screen, which is sometimes inconvenient.—D.

Fret-Machine Saw.—HOMERTON.—With reference to my reply to you (see page 765, No. 99), the following illustration should have accompanied the text:—You will see that the arms are riveted to the framework (A). About an inch from the centre



Fret-Machine Saw.

of the wheel (B) a small pin is fixed, which works in a slot of the arm (C). There is a small grooved wheel fixed under the table (D) to steady the saw when running; perhaps that is where you have managed to get your idea that the saw is fastened to a wheel.—W. R. S.

Luminous Flame Gas Stoves.—W. P. (*Southport*).—You can obtain luminous flame gas stoves from almost any maker of gas-heating appliances. Try Messrs. Clark & Co., Park Street Works, Islington, N. I have been unable to trace the company you mention, but possibly you may obtain the information you require through the *Gas and Water Review*, published at 22, Buckingham Street, Adelphi, W.C. It will be sent post free for 3d.—T. W.

Developer.—STOP.—The developer may be obtained of Mr. G. W. Secretan, 210A, Tufnell Park Road, N., in bottles, 1s. and upwards. In compound lenses, the best position for the stop is midway between the front and back combinations. The nearer the stop is placed to the back combination, so much more is the area of illumination increased and the field made less flat. If the stop is nearer to the front combination, the area of illumination is reduced, with a corresponding increase in the

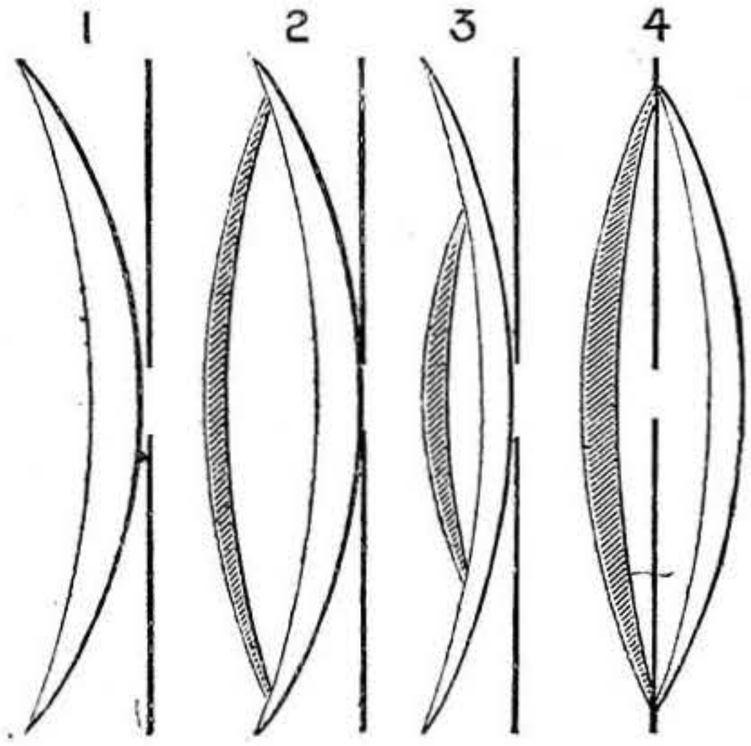


Diagram showing Construction of Ordinary Spectacle Glasses for Photographic Work. No. 1.—Single Lens Long Focus; No. 2.—Medium Focus; No. 3.—Wide Angle or Short Focus; No. 4.—Medium Angle. The convection shown is greater than that usually found in Spectacles in order to show it more distinctly. The straight line shows the position of the Stops.

flatness of the field; but in the case of portrait combinations the alteration is not very pronounced, and a spot midway between the two is generally chosen. When single lenses are used for portraiture or landscape, the stop should be placed in *front* of the lens, at such a distance that the area of illumination is just sufficiently large to avoid dark corners.—D.

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III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Upholstery.—A NEW SUBSCRIBER would like to know of any book on upholstery and decorative drapery. Also where it can be had, price, etc.

Tuck Pointing.—SLATER writes:—"Will any practical reader inform me, through the pages of 'Shop,' how tuck pointing is done? Also what materials and tools are required."

Photo Sizes.—J. A. McL. (*Glasgow*) writes:—"I would be very thankful (should you consider them worthy of a place in 'Shop') if you would insert the following questions:—Would any reader supply me with a list of photo sizes—that is, after the photos are trimmed and mounted? My purpose is to have a list of those sizes to assist me in my work of cutting mounts; also how to prepare gold paper for edges, and bronze solution for line on mounts?"

Cement.—J. J. (*Ottawa, Canada*) would be glad to hear of a cement that would join the fancy ebonite handles of umbrellas when broken.

Oil Engine.—E. A. (*Ashford*) writes:—"I should be glad of readers' opinions upon this point. Many gas engines have one or more holes round the cylinder, which the piston, in its passage through the cylinder, alternately covers and exposes. These holes communicate in the Dugald Clerk engine with exhaust, and in the Maxim engine with supply, so obviating the necessity for further mechanism for exhaust or supply respectively. Is there any important condition to be observed in making such escape and supply parts—for example, must each piston ring, and each division between the rings, be broader than the holes so used as ports to prevent catching? And might such holes be made $\frac{3}{4}$ in. in diameter, the cylinder being 5 in. in internal diameter? Also would it be necessary to arrange that the split part of each ring should not pass over the holes?"

Wicker Stains.—A. B. (*Westminster, S.W.*) writes:—"I have a wicker chair as good as when I first had it, but the stain or brown colouring has rubbed off, and it looks bad. Will some reader kindly tell me how to colour it afresh?"

Heating Room.—C. J. P. (*Derby*) writes:—"I have a room about 8 ft. by 5 ft. by 9 ft. high, which I want to warm cheaply. Can it be done in some way with a box of lime? It is used as a study, and lighted by a duplex oil lamp. A stove of any kind would be disagreeable in such a small room."

Tool Kits.—JERRY will be thankful to anyone who will give him a guide to a handy kit of tools for use for odd jobs in carpentry, soldering, painting, glazing, and shoe repairs.

Kites.—H. N. (*Ipswich*) would be glad to know if any correspondent can inform him how to make ornamental flying kites representing birds, men, etc., or how kites of large proportion, equal to drawing small loads, can be made; and where books on the subject can be obtained.

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Draughtsmanship.—H. B. P. (*Hendon*) writes, in reply to NEMO (see Vol. II., page 686):—"In answer to above, the only book I know of is 'The Draughtsman's Handbook,' by André, published by E. & F. N. Spon."

Coating for Damp Walls.—THE AUTHOR OF "EVERY MAN HIS OWN MECHANIC" in reply to R. A. P.'s inquiry on this subject, wishes to call his attention to the following extract from the book named, which will afford a sufficient reply with regard to the proportions of the ingredients to be used:—"The writer has found nothing better or more effectual (as a coating for damp walls) than a solution of shellac and naphtha in the proportion of about four ounces of the former to a quart of the latter. This solution, when applied to the damp surface of the plaster, almost immediately hardens into a varnish impervious to water, and as soon as it is hard and dry the wall paper may be pasted to it. It gives a reddish colour to the wall, but this matters little, as it is covered over and hidden from view by the paper. The smell of the naphtha is most unpleasant; but, fortunately, this soon passes off, and the inconvenience falls chiefly to the share of the workman who applies the varnish."

French Polishing.—F. C. B. (*W. Brighton*) writes:—"Having noticed that T. A. (*Belfast*) asks for a preparation to prevent the oil coming through the polish, after polishing—put a rubber of patent glaze on; this is what I have used in the shop for years, and found it answered."

Cylinder Marine Engine.—C. J. W. (*Beccles*) writes as follows in reply to BON FIL:—"Let me advise BON FIL to send to J. Sutcliffe, Leek, Staffs., for his illustrated catalogue of model engines, castings, etc., price 3d., post free. 1¼ in. bore and 1½ in. stroke would give him ample power. If he intends to have a twin-screw engine, ½ by 1 in. would probably suit. He can get all parts with link motion reversing gear, either in rough or part finished, from J. S., who will also send him drawings of boiler supplies, instructions with castings, which are brass, and which I have found easy to fit, having made a nice-looking launch engine."

Safes and Safe Locks.—ONWARDS (*Nottingham*) writes, in reply to INQUIRER:—"I have been a subscriber to WORK from the first, and I like it very much. It is thoroughly practical. In a comparatively early number of WORK I notice that a correspondent (INQUIRER) is asking for advice about opening safes. The best way, if it is possible, is by picking them. If he will order a book called 'Lock Construction,' published by Crosby Lockwood (London), he will there find an apparatus invented by Mr. Hobbs, an American, who came to this country some time ago, and astonished Chubbs's by opening their lever locks. When there is a hard steel plate fixed behind the front plate I think they could be softened with a blowpipe or a Bunsen burner. And as to fitting a safe key to pattern, the way to do is to take the exact sizes with a pair of callipers."

Ink Bottles.—J. A. G. (*West Rainton*) writes, in reply to INK BOTTLE:—"Let him send to Kilner Bros., bottle manufacturers, Dewsbury, Yorks, for catalogue. I believe the size required by him costs a little over 2s. per gross."

Frame for Wardian Case.—J. T. (*Glasgow*) writes as follows in reply to W. P.:—"The frames or astragals for Wardian cases in wood are similar to window astragals for window frames with corner uprights, the glass being set in and bedded with putty. If you wish to set the glass without putty, prepare the wood for astragal without rebate for glass, and make a groove sufficient for thickness of glass to slip into, providing for the introduction of the glass by unscrewing the vase-shaped finials which have a double screw, the one half in finial, the other half in upright astragal."

Furniture Polish Cleanser and Reviver.—B. A. B. (*Hampstead*) writes, in reply to C. H. W. (*Hastings*):—"Without knowing the receipt C. H. W. is using it is difficult to advise, but revivers do not usually contain polish. D. A. has twice advised him to omit or reduce quantity of polish. He must omit it altogether if he fails with it, and he is sure to fail by using it for reviver."

Banjo without Brackets.—B. F. (*Birkenhead*) writes, in reply to ALPHA (*Birkenhead*):—"The patentee of this is in Conway Street, Birkenhead. The banjo can be seen in his window."

Pitch of Roofs.—DUMMY writes as follows, in answer to C. M.:—"I may say that one-third of the span is more generally used as the guide for the pitch of ordinary roofs, though it depends on what they have to carry, tiled roofs requiring a steeper pitch than slated ones, a square pitch being generally used. I have heard one-fourth span indicated in a technical school as being the best. Such a one on a large roof would require very strong timbers. For a lean-to roof, two-thirds span is generally used for the height of the pitch."

Purchasing Timber.—A. R. (*Scorrier*) writes as follows in reply to A. J. H.:—"I might say that I have been quite long enough in the trade to know that three 1 in. boards cannot be had from a 3 in. deal, no matter what the understanding may be; and that A. J. H. need not be surprised at my remarks on page 635, Vol. I. As A. J. H. was writing for the instruction of amateurs, it was folly to bring or try to bring them on a level with the professional before he gave them a clear explanation. Supposing the amateur wants the board to hold up $\frac{15}{16}$, after he had worked it up and followed the advice of A. J. H., he would find that he had been misled, and that his supposed 1 in. board before it was worked could not have been more than $\frac{7}{8}$. My motive in writing as I did was that that the amateur might have a clear understanding, and not to make him equal to the professional before he really was. I may add that at the time of writing my thinking cap was in its right place, and that I am not offended at the observations of A. J. H.; it is only giving light to those on whom the light should shine."

Organ Building and Parts.—AMATEUR ORGAN BUILDER writes:—"I see in WORK, No. 128, p. 382, that C. W. T. (*Old Trafford*) wishes information on organ building and organ pipe making. Now; if C. W. T. would call upon me, I may be able to assist him, as I am now building a small four-stop organ myself. I have enclosed you my address if C. W. T. would like to write you for the same."—[If C. W. T., or any other amateur organ builder, is wanting pipes, action, or any separate part of organ work, he cannot do better than apply to Mr. Beales, organ builder, of Limes Road, Croydon, who makes this part of his business a speciality, and has ample plant for turning out every detail in organ construction. His price list is clear and reasonable.—F. J. C.]

Restoring Leather Chair Seats.—A. J. (*Faversham*) writes, in reply to ANXIOUS (see p. 366, No. 127):—"If not worn in holes, these may be very satisfactorily restored with Jackson's varnish stains. I have used these several times with perfect satisfaction."

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—S. & Co. (*London, E.C.*); C. F. (*Wellingboro*); J. M. (*Hastings*); P. A. C. (*London*); A. W. W. (*London*); F. W. (*Werneth*); C. W. B. G. (*Birmingham*); G. P. (*Elgin*); W. S. (*Ilford*); T. R. (*Sheffield*); G. J. W. (*Antrim*); G. F. J. (*Oldham*); PLUSH FRAME; A COUNTRY LAD; IRIS; G. W. C. (*Loughton*); W. S. (*Northampton*); W. L. (*Huyton*); CYCLIST; W. L. (*Hull*); NESCIENCE; J. W. (*South Lambeth*); E. R. (*Battersea*); READER FROM THE FIRST; E. F. B. (*Liverpool*); J. A. G. (*Inverness*); DENNISTOWN; A NEW READER; F. S. (*Kidderminster*); H. L. (*Carlisle*); J. P. & SON (*Hebden Bridge*); T. R. B. (*Newcastle-on-Tyne*); A. Y. (*Deptford*); F. C. S. (*Reading*); TIGER; H. S. G. (*Fulham*); W. J. (*Newcastle-on-Tyne*); BRASS; G. T. (*Bow*); NOVICE; R. A. P. (*South Kensington*); A. McC. (*Holywood*); AMATEUR; S. N. (*Southsea*).

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